

This Page Is Inserted by IFW Operations  
and is not a part of the Official Record

## **BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning documents *will not* correct images,  
please do not report the images to the  
Image Problem Mailbox.**





INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification <sup>6</sup> : <b>H04N</b></p>	<p><b>A2</b></p>	<p>(11) International Publication Number: <b>WO 00/01138</b> (43) International Publication Date: 6 January 2000 (06.01.00)</p>
<p>(21) International Application Number: PCT/US99/10389 (22) International Filing Date: 11 May 1999 (11.05.99) (30) Priority Data: 09/105,594 26 June 1998 (26.06.98) US (71) Applicant: FOTONATION, INC. [US/US]; 199 California Drive, Millbrae, CA 94030 (US). (72) Inventors: STEINBERG, Eran; 372 Douglas Street, San Francisco, CA (US). PRILUTSKY, Yury; 1426 Shoal Drive, San Mateo, CA 94404 (US). RAFFER, Scott, Neil; 1530 20th Street, San Francisco, CA 94107 (US). (74) Agent: JAFFER, David, H.; Rosenblum, Paris &amp; Isaacs, 15th floor, 160 West Santa Clara Street, San Jose, CA 95113 (US).</p>		<p>(81) Designated States: JP, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).  <b>Published</b> <i>Without international search report and to be republished upon receipt of that report.</i></p>
<p>(54) Title: CAMERA NETWORK COMMUNICATION DEVICE (57) Abstract A communication device for interconnecting a digital camera to a communication network for downloading data to a remote computer. The device has a network communication port for establishing communication with a network via a pre-defined protocol and communication mode, and has a camera communication port such as a serial, parallel, SCSI, USB or Irda-port that imitates the back end application of a PC, for connection to a digital camera for sending and receiving data to and from the camera. The camera communication port is also used for input of programming and setup data to the communication device from a PC. The device can be programmed to operate on the data directly, such as in the case of data for storage or operational direction, and/or direct the data to the camera. The device may also have a Smart card socket into which a user can insert a card to input data, such as user and camera I.D., user authorization, image marking, camera operational parameters, remote computer/destination address, etc. The device can be programmed to perform encryption, authentication, watermarking and fingerprinting procedures, as well as structuring the data for transmission over a particular network, and to automatically perform operations, such as at specific times or in response to data input.</p>		

**FOR THE PURPOSES OF INFORMATION ONLY**

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece			TR	Turkey
BG	Bulgaria	HU	Hungary	ML	Mali	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MN	Mongolia	UA	Ukraine
BR	Brazil	IL	Israel	MR	Mauritania	UG	Uganda
BY	Belarus	IS	Iceland	MW	Malawi	US	United States of America
CA	Canada	IT	Italy	MX	Mexico	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NE	Niger	VN	Viet Nam
CG	Congo	KE	Kenya	NL	Netherlands	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NO	Norway	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	NZ	New Zealand		
CM	Cameroon		Republic of Korea	PL	Poland		
CN	China	KR	Republic of Korea	PT	Portugal		
CU	Cuba	KZ	Kazakhstan	RO	Romania		
CZ	Czech Republic	LC	Saint Lucia	RU	Russian Federation		
DE	Germany	LI	Liechtenstein	SD	Sudan		
DK	Denmark	LK	Sri Lanka	SE	Sweden		
EE	Estonia	LR	Liberia	SG	Singapore		

## CAMERA NETWORK COMMUNICATION DEVICE

BACKGROUND OF THE INVENTIONField of the Invention

The present invention relates generally to digital still and video cameras and communication systems, and more particularly to a communication device providing a communication interface between a digital camera and a network system.

Brief Description of the Prior Art

Portable digital cameras are generally treated as PC peripheral devices. With conventional digital cameras, a user takes pictures until the camera memory/disk is filled and then downloads the digital image data to a PC. The camera needs to be either connected to the PC, for example through a cable, or a removable storage device such as a PCMCIA card must be manually transferred from the camera to the PC. The need to regularly make a direct, physical connection to a PC reduces the portable nature of digital cameras. In addition, downloading images to a PC is a local operation. In order to move images into the internet, the user must apply another set of commands on the local PC. Such a system is described in U.S. Patent No. 5,475,441 by Parulski et al. Cameras are also incorporated into integrated systems for displaying an image, such as a visual surveillance system in a retail store. U.S. Patent No. 5,444,483 by Maeda discloses a system including a digital camera with processing circuitry for display on a television screen.

Another limitation of conventional digital cameras is that there is no direct way to identify an image once it is loaded onto the PC. Additional information must be added manually, such as operator name, account number, camera of origin, etc. Also, there is no way of securing the images to assure that an operator does not alter them once loaded into a PC, or that the images will not be viewed by an unauthorized person as part of the transmission of the images from the PC to a remote location.

1  
2 SUMMARY OF THE INVENTION

3 It is therefore an object of the present invention to provide  
4 an apparatus to serve as an interface for enabling a user of a  
5 portable still and or video digital camera to send image data  
6 directly from the camera to a communication network for  
7 transmission and downloading to a remote network location or  
8 remote computer.

9 It is a further object of the present invention to provide an  
10 apparatus enabling a user of a conventional digital camera  
11 designed to only download directly to a PC, to send camera data  
12 directly from the camera to a communication network for  
13 transmission and downloading to a remote network location or  
14 remote computer.

15 It is a still further object of the present invention to  
16 provide an apparatus that performs operations to secure the camera  
17 data against unauthorized use during transmission through an  
18 insecure communications network, and storage in an otherwise  
19 unsecure remote destination.

20 It is a still further object of the present invention to  
21 provide an apparatus for downloading image data from a variety of  
22 digital cameras to a remote computer through a selected  
23 communication network by means of an interface selected from a  
24 group, including but not limited to a modem, an ethernet adapter,  
25 a router, a hub, or infrared and other wireless connection.

26 It is another object of the present invention to provide an  
27 apparatus that can receive and encrypt and/or mark image data from  
28 a camera and transmit the encrypted/marked data to a remote  
29 computer.

30 It is another object of the present invention to provide an  
31 apparatus that can receive image data from a camera and transmit  
32 the data to a remote computer along with additional annotation  
33 data including but not limited to time and date, user information,  
34 location information, and camera information.

35 It is an object of the present invention to provide an  
36 apparatus for connecting a digital camera output to a remote  
37 computer, the apparatus being responsive to a Smart Card to

1 program the apparatus and the camera, and to allow an authorized  
2 user to operate the apparatus.

3 It is another object of the present invention to provide an  
4 apparatus for use with a digital camera, that can control the  
5 camera by means of programming, or in response to  
6 information/direction from a remote computerized destination.

7 It is another object of the present invention to provide an  
8 apparatus for use with a digital camera, that can be programmed by  
9 a PC using the same interface on the apparatus that would later be  
10 used to communicate with the camera.

11 It is a still further objective of the present invention to  
12 provide a still and or video digital camera capable of downloading  
13 image data to a remote computer through a selected communication  
14 network by means of an interface selected from the group including  
15 but not limited to a modem, an ethernet adapter, a router, a hub,  
16 or infrared or other wireless connection.

17 It is another objective of the present invention to provide a  
18 digital camera, and a device for use with a digital camera, that  
19 automatically performs operations dependent on camera or device  
20 programming, or in response to information/direction from a remote  
21 computerized destination.

22 It is another object of the present invention to provide an  
23 apparatus for use with a digital camera, that can control the  
24 camera by means of programming, or in response to  
25 information/direction from a remote computerized destination.

26 It is another objective of the present invention to provide  
27 an apparatus for use with a digital camera, that can be programmed  
28 by a PC using the same interface on the apparatus that would later  
29 be used to communicate with the camera.

30 It is a still further objective of the present invention to  
31 provide a still and or video digital camera capable of downloading  
32 image data to a remote computer through a selected communication  
33 network by means of an interface selected from the group including  
34 but not limited to a modem, an ethernet adapter, a router, a hub,  
35 or infrared or other wireless connection.

36 It is another objective of the present invention to provide a  
37 digital camera, and a device for use with a digital camera, that

1 automatically performs operations dependent on camera or device  
2 programming, or in response to information/direction from a remote  
3 computerized destination.

4 Briefly, a preferred embodiment of the present invention  
5 includes a communication device for interconnecting a digital  
6 camera to a communication network for downloading data to a remote  
7 computer. The device has a network communication port for  
8 establishing communication with a network via a pre-defined  
9 protocol and communication mode, and has a camera communication  
10 port such as a serial, parallel, SCSI, USB or Irda-port that  
11 imitates the back end application of a PC, for connection to a  
12 digital camera for sending and receiving data to and from the  
13 camera. The camera communication port is also used for input of  
14 programming and setup data to the communication device from a PC.

15 The device can be programmed to operate on the data directly,  
16 such as in the case of data for storage or operational direction,  
17 and/or direct the data to the camera. The device may also have a  
18 Smart card socket into which a user can insert a card to input  
19 data, such as user and camera I.D., user authorization, image  
20 marking, camera operational parameters, remote  
21 computer/destination address, etc. The device can be programmed  
22 to perform encryption, authentication, watermarking and  
23 fingerprinting procedures, as well as structuring the data for  
24 transmission over a particular network, and to automatically  
25 perform operations, such as at specific times or in response to  
26 data input.

27 An advantage of the present invention is that a digital  
28 camera user can download image camera data to a remote computer or  
29 network site and therefore avoid the concern of the need to  
30 connect the camera or its removable device to a local computer in  
31 order to perform such operation.

32 Another advantage of the present invention is that it gives  
33 the camera user the capability of automatically securing the  
34 camera data, for example by encrypting or marking the data prior  
35 to sending it over a communication system and downloading it to a  
36 computer.

37 Another advantage of the present invention is that it adds



1 functionality to cameras that are not designed specifically to  
2 perform the task of connection to a remote network.

3 A further advantage of the present invention is that it  
4 provides an apparatus with a connection to a camera that is  
5 programmable for customized operations.

6 Another advantage of the present invention is that it  
7 provides an apparatus that enables a user to send data from a  
8 digital camera through a network to a plurality of destinations of  
9 a variety of types, such as network printers and remote archives.

10  
11 IN THE DRAWING

12 Fig. 1 illustrates the communication device of the present  
13 invention interconnected to a camera and communication network;

14 Fig. 2 illustrates a device that connects to a camera through  
15 a removable card interface;

16 Fig. 3 is a block diagram of the communication device;

17 Fig. 4 illustrates the communication device connected to a  
18 network through one or more types of network connections;

19 Fig. 5 illustrates a communication device connected to more  
20 than one network;

21 Fig. 6 demonstrates various ways of interconnecting the  
22 communication device to a camera;

23 Fig. 7 summarizes various programming and operational  
24 options;

25 Fig. 8 summarizes various operations that the communication  
26 device can perform on images;

27 Fig. 9 shows an alternate embodiment wherein the  
28 communication device is integrated with a camera;

29 Fig. 10 illustrates an embodiment of the present invention  
30 wherein a communication device is configured for connecting data  
31 from a camera directly to a video/TV receiver;

32 Fig. 11 illustrates a communication device configured for  
33 sending different data to separate destinations;

34 Fig. 12 illustrates a communication device configured for  
35 distinguishing two sets of data and sending one set to one  
36 location and another to a second location.

37 Fig. 13 illustrates a plurality of cameras each communicating

1 through a communication device to a single destination;

2 Fig. 14 is a flow chart illustrating automation related to  
3 the communication device;

4 Fig. 15 is a flow chart illustrating automation related to  
5 the destination device;

6 Fig. 16 presents summaries of types of data that can be sent  
7 from the destination to the communication device, and processing  
8 that can be done by the destination; and

9 Fig. 17 is a flow chart illustrating automation in a camera  
10 having a built-in communication device.

#### 11 12 DESCRIPTION OF THE PREFERRED EMBODIMENT

13 Referring now to Fig. 1 of the drawing, a preferred  
14 embodiment of the communication device 10 of the present invention  
15 is illustrated in use with a digital camera 12, PC 14,  
16 communication network 16 and a remote destination 18, which can be  
17 any type of network object, such as a PC, a printer, phone switch,  
18 server, etc. The device 10 has a camera communication port 20 for  
19 interconnection to either the camera 12 as indicated by cable 22  
20 to port 24, or to the PC 14 through cable 26. The dashed lines 28  
21 are to indicate that either the camera 12 or PC 14 can be  
22 connected to port 20. The device 10 has a network communication  
23 port 30 shown connected to the network 16 through line 32, and a  
24 Smart card port 34 for installation of a Smart card 36. The  
25 connection between the remote destination 18 to the network 16 is  
26 indicated by line 38. The communication device 10 includes any of  
27 various communication or network apparatus for sending data  
28 through the network 16.

29 The use of the communication device 10 involves first  
30 programming it as required. Programming is accomplished through  
31 use of a PC 14 connected to port 20 and/or through data entry from  
32 the Smart card 36 through the port 34 and/or from a remote  
33 computer at destination 18 by way of the network 16. Examples of  
34 programming options will be given in the following detailed  
35 description. Generally, the device 10 can be programmed to send  
36 instructions and data to the camera and to perform operations on  
37 data received from the camera, and to send data to the specified

1 remote destination 18 by way of the network 16. Typical uses of  
2 the Smart card are for entry of additional data such as a user  
3 I.D., camera ID, an address or phone number of the remote  
4 destination/network site 18, operational instructions to the  
5 camera 12 and communication device 10, etc.

6 The primary function of the communication device 10 is to  
7 perform the necessary operations required to receive data from the  
8 camera 12 and then to send the data to the remote destination 18  
9 by way of a selected communication media indicated by network 16.  
10 Other operations/functions will be described in the following  
11 specification.

12 The input 20 of the device 10 imitates the back end  
13 application of a PC, thus becoming transparent to the camera that  
14 operates as if it is communicating to a PC. The communication  
15 device 10 establishes communication with a network 16 via a pre-  
16 defined protocol and communication mode. The device 10 receives  
17 image data and other information data from a camera 12, and  
18 secures the data and structures it according to the required  
19 protocol, performs any other programmed operations, and then sends  
20 the data through the network for transmission to a destination  
21 device 18, such as a computer, printer, server, phone switch,  
22 etc., placing the data in assigned locations as defined by the  
23 device ID or commands. Communication between the device 10 and  
24 the destination device can be bi-directional, i.e. a destination  
25 device host 18 can download information to the communication  
26 device 10 as well as receive information. Any and all types of  
27 media are included in the spirit of the present invention.  
28 Particular embodiments of the communication device 10 include the  
29 functions of one or more devices including a telephone modem,  
30 ethernet adapter, a router, hub, etc. The device 10 can also be  
31 configured to transmit through a wireless communication link, such  
32 as satellite communication, etc. Signals include infrared, or any  
33 RF frequency such as UHF, VHF, or microwave.

34 In wireless communication between the device 10 and  
35 destination 18, line 32 is replaced with a wireless connection  
36 between the device 10 and the network 16, as indicated by  
37 antenna/emitter 40 on the communication device 10 and transceiver

1 42 connected to the network 16.

2 Fig. 1 also shows wireless communication between the camera  
3 12 and communication device 10, indicated by a transceiver 44  
4 connected to the camera port 24, and an antenna/emitter 46 on the  
5 communication device 10 for sending and receiving data between the  
6 camera 12 and device 10. All types of radiated signals are  
7 included in the spirit of the invention, the particular type  
8 depending on such factors as distance and environment, etc.

9 Because the device 10 is programmable, there is significant  
10 flexibility in its use. For example, device 10 can be programmed  
11 to perform functions automatically, for example to receive  
12 instruction from a destination device/host computer 18 to direct  
13 the camera to take a picture at a particular time of day, or every  
14 hour and/or to download images or upload information at a specific  
15 time from the camera. The device 10 can be programmed by a  
16 destination device 18 to operate a camera "off-line". After  
17 uploading the instruction to the device 10, the communication can  
18 be terminated. The device 10 can keep the instructions and send  
19 them to the camera appropriately.

20 In another example, the device 10 can be programmed to  
21 automatically connect to the network 16 when the camera image data  
22 storage is full, or partially full, and then to download the image  
23 data and subsequently disconnect from the network 16. Upon  
24 completion of downloading and receiving a confirmation from the  
25 destination 18, the device 10 can continue by deleting the image  
26 data from the camera.

27 The communication device 10, or camera if it is programmable,  
28 can also be loaded with information to accompany an image, and  
29 this information can be included, for example, in an image header.  
30 Examples of valuable information may include an account number and  
31 a camera ID. The device 10 can be programmed to automatically  
32 include this information with image data downloaded to a  
33 destination. Such identification avoids confusion as to the  
34 source of the image.

35 The communication device is designed with selected features  
36 permanently programmed. An alternate embodiment of the present  
37 invention includes permanent programming to allow downloading of

1 data only to a specific destination. Such fixed programming helps  
2 avoid theft of the device or camera for a different use. In  
3 general, it is a specific feature of the present invention to  
4 provide a device with permanent programming for any specific  
5 purpose.

6 Another alternate embodiment includes fixed programming to  
7 automatically request and receive a camera ID from the destination  
8 device 18, and/or smart card 36 when connected to either of these.  
9 The camera ID is then included along with image data. A still  
10 further embodiment includes permanent programming to read and  
11 increment a counter and assign a unique number to each image  
12 received. In this way each image has associated with it a unique  
13 number, and the ID of the camera that secured the image. The  
14 programming for these functions will be understood by those  
15 skilled in the art, and is not shown. The required clock,  
16 counter, ROM and other necessary circuit components are  
17 illustrated in block form in Fig. 3. In an embodiment wherein the  
18 communication device is integrated with a digital camera, the  
19 camera ID is programmed into ROM, and therefore no additional  
20 request or receiving of a camera ID is required. The operation of  
21 including an image number is accomplished in the same manner as  
22 with the separate communication device. The integrated camera and  
23 communication device will be more fully described in the following  
24 text in reference to Fig. 9 of the drawing.

25 Other embodiments of the communication device 10 include the  
26 incorporation of visual 48 and sound 50 indicators to inform a  
27 user concerning operations that need to be accomplished. These  
28 can function either off or on line. For example, the alarm/sound  
29 indicator 50 can be programmed to sound, and/or the visual  
30 indicator can light if the device 10 is programmed to connect the  
31 camera to the network at a specific time and there is no  
32 connection. The indicators can also give notice when the image  
33 storage has reached a certain level. A visual display 52 is  
34 optional for presentation of useful information such as the  
35 remaining number of images to be sent to a destination 18, the  
36 remaining time required for transmission, notice of connection to  
37 a camera 12, and notice of connection to a destination 18.

1 Internally, the device 10 includes a counter to maintain the image  
2 count for display as discussed above, and may optionally also  
3 include a clock for use in indicating the date and time of  
4 receiving an image on the display 52.

5 An alternate construction 54 of a device that is functionally  
6 similar to device 10 is shown in Fig. 2 wherein the connection  
7 from the device 54 to a camera 56, or to the PC 14 is made through  
8 a removable storage interface such as a PCMCIA card, SamrtMedia  
9 CompactFlash Klik! Card, etc. For example, a PCMCIA card 36 can  
10 be placed in the camera card slot 58 and camera data can be  
11 downloaded to the card 36. The card 36 can then be placed in the  
12 device 54 slot 60, and the camera data can be loaded into the  
13 device 54 for processing and transmission through connection 62 to  
14 a destination 20. An alternate embodiment is also indicated in  
15 Fig. 2, wherein a PCMCIA card extension 64 is provided for  
16 installation in the PCMCIA card slot 58 of the camera 56. Other  
17 configurations and types of connections in the design of the  
18 communication device will be apparent to those skilled in the art  
19 and these are to be included in the spirit of the present  
20 invention.

21 Referring to Fig. 3, the internal structure of the  
22 communication device 10 is shown in block form. A processor 66  
23 performs operations according to specific programming generally  
24 indicated by the image processing block 68, and coordinates the  
25 activation of the communication device 10. Specifically noted in  
26 the processor block 66 are the operations of maintaining the time  
27 and date (clock 70), for inclusion with image data to indicate the  
28 time and date of the image processing. The processor also keeps an  
29 account of the number of images received and sent (block 72), for  
30 display on the LED screen 52, and processes additional data (block  
31 74) for various purposes, including user data to be included with  
32 image data. In addition, the processor performs security  
33 operations when programmed to do so (block 76). Typically, a ROM  
34 78 is provided to store permanently programmed data, and a RAM 80  
35 is used for temporary storage. Specific camera communication  
36 apparatus includes a camera connection controller 82, and an  
37 optional infrared transceiver 84 for a wireless connection to the

1 camera. The camera controller 82 connects to the camera through  
2 port 20 and/or the transceiver 84, and additional connective  
3 hardware as indicated in Fig. 1. The network communication  
4 apparatus similarly includes, in addition to the processor and  
5 memory blocks, a network connection controller 86, communicating  
6 with the network through line 32 and/or connected to a modem 88  
7 through bus 90 and then to the network through a modem output bus  
8 92 and/or a bus 94 to a transceiver 96 to the antenna/emitter 40  
9 via a bus 98 for a wireless connection to the network. Similarly,  
10 the camera connection controller is optionally connected via bus  
11 10 to a transceiver 102 connected through bus 104 to  
12 antenna/emitter 46 for communication with the camera 12. The user  
13 indicators are operated through a user interface controller 108.  
14 The indicators include a battery condition indicator 110, the  
15 alarm light 48, the sound alarm 50, a power switch 112, and the  
16 LED display 52. The power supply 114 is also indicated with  
17 options including a battery 116, an AC battery charging supply  
18 input 118, a phone line power connection 120 and a line 122 from  
19 an alternate power bus, not shown.

20 Fig. 4 illustrates accommodation of a number of types of  
21 network connections with a single communication device 124,  
22 including device circuitry 126 similar to that shown in Fig. 3,  
23 including a modem 128 and also an Ethernet adapter 130, a router  
24 132, a hub 134, an infrared link 136 and/or any wireless  
25 connection 138. The device 124 can be configured to provide  
26 compatible data format for any one or more of the possible types  
27 of network connections, either individually or simultaneously. In  
28 the case of simultaneous output to more than one media, the device  
29 124 includes a separate output for each type of connection. The  
30 various selected connection types can each transmit through a  
31 corresponding part of network 16 to a single computer or remote  
32 network node 18, or they can each output to a different remote  
33 destination, such as illustrated in Fig. 5 where output from a  
34 camera 12 is sent by a communication device 140 by way of an  
35 ethernet adapter 130 through a network 139 to a first remote  
36 computer 142, and also by way of a wireless connection/transceiver  
37 138 to a transceiver 42, through a network 141 to a second remote

1 computer 146, or alternately to the computer 142 as indicated by  
2 line 148.

3 The communication devices described in this disclosure can be  
4 connected to a camera by any of a variety of port types. This is  
5 illustrated in Fig. 6 showing a camera 150 connected to a  
6 communication device 152 by way of serial ports 154, 156, SCSI  
7 ports 158, 160, IrDa ports 162, 164, parallel ports 166, 168 and  
8 USB ports 170, 172 from communication device 152 to the camera  
9 150. The device 152 can have any combination of outputs and other  
10 features as described for communication devices elsewhere in this  
11 disclosure. As shown, the device 152 has an output port 174 and  
12 an optional Smart card port 176 for use with a Smart card 36. The  
13 various interconnecting lines or media are simply noted as lines  
14 178, each configured appropriately for the type of port. In the  
15 case of infrared communication the corresponding line 178 is not a  
16 physical communication cable but rather an unobstructed line of  
17 view. The camera and communication device can have one or more of  
18 the ports shown in Fig. 6. The spirit of the present invention  
19 includes other communication lines or media between the camera and  
20 communication device in addition to those shown in reference to  
21 Fig. 6, and between the communication device and a remote computer  
22 in addition to those illustrated in reference to Fig. 4. Such  
23 variations will be apparent to those skilled in the art.

24 As discussed above, the communication device of the present  
25 invention provides downloading of camera images onto computerized  
26 systems in an automated manner. The communication device is  
27 programmed to include information about the camera, the remote  
28 computer and intervening network and the corresponding method of  
29 transporting the information.

30 In addition to these more general features of the  
31 communication device, numerous programming and operational options  
32 are included in the spirit of the present invention, examples of  
33 which are given in the lists of Fig. 7. The types of connections  
34 from the communication device to a network were illustrated in  
35 detail in Fig. 4. These options are also listed in Fig. 7 under  
36 the heading "Device Connection to Network". Such connections  
37 require specific ordering/arranging of data known as protocols.



1 Typical protocols are listed in Fig. 7 under "Device to Network  
2 Protocols". A user will also often find it convenient to include  
3 the camera serial number or any other unique identification, along  
4 with the image information. Certain types of camera information  
5 are listed under "Device Information Re Camera", and this and  
6 other camera information are programmed into a device by use of  
7 the Smart card installed for example in port 34 of Fig. 1, or by  
8 use of a PC by way of port 20, or from a remote computer at 18 as  
9 illustrated in Fig. 1, or by other means that will be apparent to  
10 those skilled in the art.

11 In the same way, information regarding the identity by the  
12 particular communication device, and other information can be  
13 programmed into the device. Examples include a unique  
14 communication device ID, the date and time maintained by a built-  
15 in clock, the number of images stored and/or downloaded, and the  
16 numbers retained on a consecutive image counter in the  
17 communication device. These features are also listed in Fig. 7  
18 under DEVICE GENERATED INFORMATION.

19 The communication device is also programmed with information  
20 concerning the destination 18, which normally will be a remote PC,  
21 but could be some other apparatus such as a video monitor or a  
22 printer, etc. This type of information is listed under "Device  
23 Information Re Destination" in Fig. 7.

24 Requiring a user password avoids the possibility that an  
25 unauthorized person will alter data. Phone number and IP address  
26 data can also be loaded into the communication device, and are  
27 listed under "Operational Information for Devices and/or Camera"  
28 in Fig. 7. Detailed examples of operations to be performed on  
29 images will be discussed in reference to Fig. 8.

30 The communication device programming also includes  
31 instructions that are then sent by the communication device to the  
32 camera, examples of which are listed in Fig. 7 under "Instruction  
33 to Camera From Device".

34 The purpose of the communication device is to receive  
35 information from the camera and then to store it, or modify it,  
36 and/or add to it according to the program and data, and send the  
37 required data to the network. Examples of data received from the

1 camera are listed in Fig. 7 under "Device Information From  
2 Camera". Examples of operations performed on image data are  
3 included in the list of Fig. 8. A particular embodiment includes  
4 the device programmed to add identifiers to the image, such as  
5 including the date and time of image acquisition, the user's name,  
6 a unique camera I.D. or image I.D. and the date and time of  
7 transmission. This data can be placed on the image, or in an  
8 image header, or outside the image area. The communication device  
9 can also be programmed to mark, i.e. watermark or finger print,  
10 which are invisible marks, the images for the purpose of deterring  
11 unauthorized use, and/or it can be programmed to prepare image  
12 authentication data, or to encrypt the entire set of image data to  
13 prevent any unauthorized person from viewing the image. For  
14 example, the communication device can be programmed to store and  
15 encrypt selected image data points for comparison with data from  
16 corresponding locations of a questionable image at a later time.

17 It is noted in Fig. 8 that the device can also perform other  
18 operations such as compressing or expanding files, and parsing  
19 files and converting them to different formats.

20 The specific items listed in Figs. 7 and 8, and discussed  
21 above concerning programming of the communication device are all  
22 given by way of example. The basic objective of the present  
23 invention is to provide a communication device that will allow a  
24 digital camera to be connected to one or more types of  
25 communication networks for downloading of data to, and receiving  
26 data from a remote destination, which is typically a computer.  
27 Details of the circuitry and programming of the communication  
28 device do not need to be described in this disclosure because  
29 those skilled in the art of digital apparatus will understand how  
30 to design the device to perform the operations disclosed and  
31 claimed herein.

32 The embodiments of the present invention illustrated above  
33 are preferred embodiments. The communication device is  
34 particularly useful in these forms in that it allows existing  
35 digital cameras that do not have the functionality to connect to a  
36 network, to be connected to any of a variety of communication  
37 networks for transmission of image data and receiving

1 instructions. Existing digital cameras do not have to be modified  
2 to function with the communication device of the present invention  
3 because an interconnection is made through an existing camera port  
4 using the existing protocol.

5 An alternate embodiment of the present invention is  
6 illustrated in Fig. 9 wherein a communication device 180 is  
7 integrated inside a digital camera 182 containing a digital camera  
8 section 184. The novel digital camera 182 can send and receive  
9 data to and from a communication network. The camera 182 in this  
10 embodiment has a serial port 186 for connection to a line 188 to a  
11 PC for receiving programming data, for use in a downloading image  
12 data directly to a PC, as in a conventional digital camera. The  
13 camera 182 also has one or more communication ports 190 for  
14 connection to one or more lines 192 to a communication network.  
15 The network communication options discussed for example in  
16 reference to Figs. 4 and 5 also apply to the device 180 of Fig. 9.  
17 The operation of the device portion 180, and various features such  
18 as the display, indicators, etc. are the same as discussed above  
19 in regard to the external communication devices such as 10 or 124.  
20 Port 190 is for acceptance of a Smart card 36. Other optional  
21 features are not repeated in Fig. 9 for simplicity and to avoid  
22 redundant discussion.

23 Fig. 10 illustrates an embodiment of the invention wherein a  
24 communication device 192 is configured for connecting data from a  
25 camera 194 directly to a video/TV receiver 196. This connectivity  
26 allows both preview of live images from the camera as well as  
27 post-view or playback of either still images, or video when  
28 applicable.

29 Figs. 11 and 12 illustrate communication devices that are  
30 configured for transmission to separate destinations. Fig. 11  
31 illustrates a case where the camera 198 is capable of outputting  
32 first and second sets of data on lines 200 and 202 respectively,  
33 to a communication device 204, and wherein it is desirable to send  
34 a first set of data to a first destination 206 and a second set of  
35 data to a second destination 208. For example, a journalist may  
36 want to send high resolution data to his private PC at destination  
37 206 and send low resolution data to a potential customer for

1 preview at destination 208 prior to placing a purchase order for  
2 the image.

3 Other applications include "escrow" security transmissions  
4 where images "first data" are sent to a first location 206, and  
5 other information "second data" is automatically sent to a  
6 second location/recipient 208. In the case of secured images, an  
7 authenticated image can be sent to a first location such as 206  
8 and an image signature and/or authentication data can be sent to a  
9 second location 208. Similarly, encrypted or watermarked data can  
10 be sent to a first location, and original data to a second  
11 location.

12 In the case where the camera cannot provide both the first  
13 and second data, the second data can be prepared by the  
14 communication device, as illustrated in Fig. 12. In this case,  
15 the camera 210 only outputs original image data. The  
16 communication device 212 is programmed to create encrypted image  
17 data and/or authentication data, or include other data, and then  
18 output first selected data to a first destination/location 206 and  
19 a second set of data to location/destination 208.

20 As referred to in the above description, the device of the  
21 present invention performs operations in an automated manner.  
22 Novel methods of operation of the communication device and/or  
23 integrated camera device will now be described in greater detail.

24 The communication devices described above, used in a system,  
25 for example the system described in Fig. 1 wherein a programmable  
26 communication device 10 interconnects a camera 12 with a  
27 destination 18, or a similar system with a communication device  
28 integrated with a camera as described in reference to Fig. 9,  
29 provide a structure capable of automatic and intelligent  
30 operation. The computerized destination 18 can be of various  
31 configurations, including a single PC or a network server.

32 The method and apparatus of the present invention in  
33 automatic operation has great utility when a plurality of  
34 communication devices, either as separate devices or integrated  
35 with a camera, are in service and attempts are made to download  
36 image data. Image data requires a large memory, and downloading  
37 from a number of communication devices is time consuming.

1 Networks encountering such a load of image data can easily be  
2 overloaded, requiring either large increases in network band  
3 width, or a method of organizing the downloading in an automated  
4 manner. Such automation is a particularly useful feature of an  
5 embodiment of the present invention and is illustrated in Fig. 13  
6 where three sets of cameras 214, 216, and 218 and communication  
7 devices 220, 222, and 224 are connected to a single destination  
8 226 through a network 228.

9 Various ways of automating the transfer of image data from  
10 the cameras to the destination will be understood by those skilled  
11 in the art of automation after reading the description of the  
12 invention. A preferred embodiment involves programming the  
13 devices 220, 222, and 224 to automatically "re-dial" for a hook-  
14 up with the destination when a busy signal is received. The  
15 destination simply accepts a first call and ignores subsequent  
16 calls until the processing of the first call is complete. An  
17 alternate method includes the destination storing the numbers of  
18 the calling communication devices in the order received, and then  
19 notifying the next device in line when the destination is ready  
20 for accepting the next download. This approach has an advantage  
21 over the re-dialing approach in guaranteeing each device its  
22 priority.

23 Referring now to Fig. 14, an example is illustrated wherein a  
24 communication device is programmed to perform automatic  
25 operations. Block 230 (set up device) represents the programming  
26 that is accomplished through use of a PC 14, Smart card 36, or the  
27 computer/destination 18 through a network 16. Fig. 14 is a  
28 simplified example of programmed decisions made by a communication  
29 device. Details of programming for such operations are well  
30 understood by those skilled in the art and therefore are not  
31 described in detail.

32 The example of Fig. 14 illustrates the communication device,  
33 for example device 10, programmed to query the camera  
34 communication port 20 to determine if a camera is connected. The  
35 communication device, for example, can be programmed to check for  
36 a camera connection (block 232) at periodic intervals, or at  
37 certain times of the day. If the camera is connected, the

1 communication device can then receive and evaluate data from the  
2 camera, an operation which can be fully automatic if the camera is  
3 programmed to receive and respond to commands through line 22. If  
4 not, a user can manually trigger the camera 12 to download the  
5 data to the communication device. In either the case of automatic  
6 or manual download to the communication device, block 234  
7 represents this function. Block 236 indicates an option for a  
8 compatible camera 12, wherein the communication device queries the  
9 camera to determine what percentage of the image storage capacity  
10 is filled. If it exceeds a certain predetermined amount, for  
11 example 75%, the communication device responds by instructing the  
12 camera 12 to download the image data (block 234). If not, the  
13 device can continue to check for a camera connection and image  
14 memory available on a periodic basis, and/or at certain times.

15 Once image data is loaded, the communication device can  
16 respond to programming to perform any of a variety of operations  
17 as discussed above, such as encrypting, creating authentication  
18 data and relegating selected data for subsequent transmission to  
19 one or more destinations. This is indicated simply as block 238.

20 The communication device can be programmed to send the  
21 relegated data at certain times. This programming is symbolically  
22 indicated by block 240, and at the programmed time the device  
23 checks the output port 30 (Fig. 1) to determine if a connection is  
24 made to a network (block 242). If so, the communication device  
25 further checks to determine if the destination is connected and  
26 ready. This is indicated by block 244 for a single destination  
27 and by blocks 246 and 248 for two separate destinations, although  
28 any number of destinations are within the scope of the present  
29 invention.

30 Once the communication device determines that the destination  
31 is ready, the data is transmitted as indicated by blocks 250, 252  
32 and 254. Block 250 also indicates an option indicating  
33 programming of the communication device to include a unique ID  
34 with the transmitted data to connect the data to a specific  
35 location, i.e. database, within the destination. The purpose of  
36 Fig. 14 is primarily to illustrate automation within the  
37 communication devices of the present invention. Automation is

1 also possible in the destination 18, and in the camera 12 in those  
2 cases where the camera 12 is programmable.

3 Fig. 15 will now be used to discuss automation within the  
4 destination 18. It should also be understood that the present  
5 invention includes combinations in which automation occurs in the  
6 communication device, camera and destination, or in any  
7 combination of the three to accomplish required programming  
8 objectives.

9 Block 258 of Fig. 15 symbolizes programming of the  
10 destination 18 to perform operations, examples of which will be  
11 described in reference to the various blocks of Fig. 15. Block  
12 260 indicates the destination determining if the communication  
13 device is connected to the network. The destination can be  
14 programmed to check for a connection at various intervals or times  
15 of day, etc. The destination can also be programmed to respond to  
16 a signal from the communication device indicating a requirement to  
17 transmit data. Both of these options, either an active query to  
18 the communication device or a response from the communication  
19 device are included in the step indicated by block 260.

20 Once connection is established between the destination and  
21 the communication device, the destination can send instructions to  
22 the communication device as indicated by block 262. As with block  
23 260, this action by the destination can be self initiated or in  
24 response to an instruction received from the communication device  
25 to send data. The data is then received by the destination (block  
26 264) and processed (block 266). The communication device can be  
27 either separate from the camera or integrated with it.

28 Fig. 16 lists examples of data that can be sent by a  
29 destination to a communication device including instructions to  
30 the communication device to direct the camera to take a picture at  
31 a set time or at certain intervals. Account identification,  
32 titles or other information can be sent for inclusion in an image  
33 header, or for watermarking, etc. Operational data can be sent to  
34 inform the user when and where to take a picture. A map showing  
35 where to take a picture can be sent, for example, which can be  
36 displayed by the user on a camera visual display, and corrective  
37 notices can be sent informing the user of any problems with the

1 downloaded image data such as chronic underexposure, focus  
2 problems, etc. The destination can also send instructions to the  
3 communication device to check camera memory, download data,  
4 encrypt data, etc., all controlled by the destination.

5       Upon receiving data from the communication device (block  
6 264), the destination can automatically process the data according  
7 to specific programmed objectives (block 266). A number of  
8 possibilities are included in Fig. 16 under "Data Processing by  
9 Destination". In cases where data is received in unencrypted  
10 form, it can encrypt and store the data, or it can decrypt  
11 encrypted data and print images automatically or archive them.  
12 The destination 18 can also automatically distribute selected data  
13 items to other remote locations, such as on the web, or e-mail at  
14 a low resolution image for inspection prior to a sale. The  
15 destination can also store authentication data of an original  
16 image and create corresponding authentication data from a  
17 questionable image, and compare the two sets of authentication  
18 data to determine the validity of the questionable image.

19       In summary of the automatic features of the invention, the  
20 destination, for example a server, can call the communication  
21 device to notify it of a particular time to send data to a server,  
22 for example based on local and remote network load, server  
23 processing load, server storage capacity, fulfillment (printing),  
24 system load, and other factors. As explained above, there may be  
25 querying/handshaking between the communication device and the  
26 server to determine if there are sufficient images to send, i.e.  
27 to determine the space available in the image storage memory of  
28 the communication device or camera-device. Alternatively, the  
29 communication device can query the destination to initiate the  
30 sending of data.

31       Another automatic feature of the present invention is the  
32 automatic inclusion of prescribed information along with image  
33 data, such information including for example, a unique ID, date,  
34 time, etc. Closely related to the information included with an  
35 image is a phone number or network IP received by the device or  
36 camera for automatic dialing to a destination. The communication  
37 device can also automatically receive images and related



1 information by querying the destination at preprogrammed  
2 times/intervals. Another automatic feature includes automatic  
3 downloading based on priority when some users have priority over  
4 others.

5 Fig. 17 applies to the integrated camera-device of Fig. 9.  
6 The camera-device is first programmed as indicated by block 268.  
7 A picture is taken (block 270), and the programmed operations are  
8 performed (block 272). The camera-device can then check memory  
9 to determine if data should be downloaded (block 274). If memory  
10 space is low, the camera-device will check for a network  
11 connection (block 276) and alternatively also display a notice to  
12 the user of low storage capacity available (block 278). Once a  
13 connection is made to the network, the data is downloaded (block  
14 280). In general, all of the features discussed relative to the  
15 communication device 10 apply also to the camera 182 with an  
16 integrated communication device 180 as illustrated in Fig. 9,  
17 except for those comments that refer to the external connection  
18 between the camera and the communications device.

19 Although the present invention has been described above in  
20 terms of a specific embodiment, it is anticipated that alterations  
21 and modifications thereof will no doubt become apparent to those  
22 skilled in the art. It is therefore intended that the following  
23 claims be interpreted as covering all such alterations and  
24 modifications as fall within the true spirit and scope of the  
25 invention.

26 What is claimed is:

CLAIMS

- 1        1.    A communication device comprising:  
2            (a) camera communication means for sending and  
3        receiving data to and from a digital camera; and  
4            (b) network communication means for sending and  
5        receiving said data through a network, to and from a  
6        destination device.
- 1        2.    A communication device as recited in claim 1  
2        wherein said camera communication means utilizes an existing  
3        protocol of communication of said camera for communication  
4        to a PC, whereby said communication device is transparent to  
5        said camera.
- 1        3.    A communication device as recited in claim 1  
2        wherein said network communication means includes a modem.
- 1        4.    A communications device as recited in claim 3  
2        wherein said modem is connected via predefined phone numbers.
- 1        5.    A communication device as recited in claim 1  
2        wherein said network communication means includes means for  
3        connecting to an ethernet network.
- 1        6.    A communication device as recited in claim 1  
2        wherein said network communication means includes a network  
3        router.
- 1        7.    A communication device as recited in claim 1  
2        wherein said network communication means includes means for  
3        establishing a wireless connection to a network.
- 1        8.    a communication device as recited in claim 1  
2        wherein said network communication means includes means for  
3        establishing a satellite connection to a network.

1           9. A communication device as recited in claim 1  
2 wherein said destination device is a printer.

1           10. A communication device as recited in claim 1  
2 wherein said destination device is a phone switch.

1           11. A communication device as recited in claim 1  
2 wherein said destination device is a server.

1           12. A communication device as recited in claim 1  
2 wherein said communication device is programmable.

1           13. A communication device as recited in claim 1  
2 wherein said communication device has a unique  
3 identification.

1           14. A communication device as recited in claim 13  
2 wherein said communication device sends said unique  
3 identification as part of said data to be transmitted to said  
4 destination device.

1           15. A communication device as recited in claim 1  
2 wherein said communication device further comprises a counter  
3 to provide a unique identification number for image data  
4 representing a particular image.

1           16. A communication device as recited in claim 15  
2 wherein said communication device sends said unique  
3 identification of each said image as part of said  
4 transmission.

1           17. A communication device as recited in claim 1  
2 wherein said communication device includes means for  
3 providing time and date identification data indicating the  
4 time and date of processing of each image.

1           18. A communication device as recited in claim 17

2 wherein said communication device receives said time and date  
3 identification data from the network.

1 19. A communication device as recited in claim 18  
2 wherein said communication device sends said time and date  
3 identification data as part of said data transmitted to said  
4 destination device.

1 20. A communication device as recited in claim 1  
2 wherein said communication device includes global positioning  
3 detection apparatus.

1 21. A communication device as recited in claim 20  
2 wherein said communication device sends global position data  
3 as part of said data transmittal to said destination device.

1 22. A communication device as recited in claim 12  
2 wherein said camera communication means includes means for  
3 entering data for programming said communication device.

1 23. A communication device as recited in claim 12  
2 wherein said communication device is programmed with data  
3 received from said destination device.

1 24. A communication device as recited in claim 1  
2 further comprising a Smart card port for reception of a Smart  
3 card.

1 25. A communication device as recited in claim 12  
2 wherein said communication device is programmable to receive  
3 camera operational parameter data and to send said camera  
4 operational parameter data to a camera connected to said  
5 communication device.

1 26. A communication device as recited in claim 12  
2 wherein said communication device is programmable to  
3 watermark image data received from a camera.

1           27. A communication device as recited in claim 12  
2 wherein said communication device is programmable to encrypt  
3 image data received from a camera.

1           28. A communication device as recited in claim 12  
2 wherein said communication device is programmable to form  
3 image authentication data.

1           29. A communication device as recited in claim 1  
2 wherein said network communication means is for sending data  
3 to a plurality of network destination devices.

1           30. A communication device as recited in claim 1  
2 further comprising a visual display for indicating the  
3 progression of said sending data.

1           31. A communication device as recited in claim 30  
2 wherein said visual display indicates a remaining number of  
3 images to be sent.

1           32. A communication device as recited in claim 30  
2 wherein said visual display indicates remaining time for  
3 transmission.

1           33. A communication device as recited in claim 30  
2 wherein said visual display indicates established connection  
3 to the camera.

1           34. A communication device as recited in claim 30  
2 wherein said visual display indicates established connection  
3 to said destination device.

1           35. A communication device as recited in claim 1  
2 wherein said camera communication means includes a serial  
3 port.

1           36. A communication device as recited in claim 1  
2 wherein said camera communication means includes a parallel  
3 port.

1           37. A communication device as recited in claim 1  
2 wherein said camera communication means includes a SCSI port.

1           38. A communication device as recited in claim 1  
2 wherein said camera communication means includes a USB port.

1           39. A communication device as recited in claim 1  
2 wherein said camera communication means includes an infrared  
3 port.

1           40. A method for transmitting digital data from a  
2 camera to a destination device said method comprising:  
3           (a) performing operations by use of a communication  
4 device, said operations including  
5           (i) sending said digital data from a camera to  
6 said communication device; and  
7           (ii) structuring said camera data within said  
8 communication device to a compatible protocol for  
9 transmission through a network to a communication network to  
10 a destination device.

1           41. A method as recited in claim 40 wherein said  
2 destination device is a computer.

1           42. A method as recited in claim 40 wherein said  
2 destination device is a computer.

1           43. A method as recited in claim 40 wherein said  
2 destination device is a network.

1           44. A method as recited in claim 40 wherein said  
2 destination device is a printer.

1           45. A method as recited in claim 40 wherein said  
2 operations further include  
3           (a) encrypting said digital camera data to form  
4 encrypted camera data; and  
5           (b) structuring said encrypted data to a compatible  
6 protocol for transmission through a network to a destination  
7 device.

1           46. A method as recited in claim 40 wherein said  
2 operations further include  
3           (a) creating authentication data; and  
4           (b) structuring said authentication data to a  
5 compatible protocol for transmission through a network.

1           47. A method as recited in claim 40 further comprising  
2 programming said communication device to add additional data  
3 for transmission with said camera data to a network.

1           48. A method as recited in claim 40 further  
2 comprising:  
3           programming said communication device with operational  
4 instructions for transmission to said camera.

1           49. A method as recited in claim 40 further  
2 comprising:  
3           programming said communication device for encryption of  
4 camera data.

1           50. A method as recited in claim 40 further  
2 comprising:  
3           programming said communication device for creating  
4 authentication data.

1           51. A method as recited in claim 40 further  
2 comprising:  
3           programming said communication device for watermarking  
4 of camera data.

1           52. A method as recited in claim 40 further  
2 comprising:  
3           programming said communications device for  
4 fingerprinting data.

1           53. A method as recited in claim 50 further  
2 comprising:  
3           (a) transmitting unencrypted digital camera data to a  
4 first said destination device; and  
5           (b) transmitting said authentication data to a second  
6 said destination device.

1           54. A method for transmitting digital camera data  
2 comprising:  
3           (a) uploading said digital camera data from a camera  
4 to a communication device; and  
5           (b) structuring said camera data within said  
6 communication device to a compatible format for transmission  
7 and display of said digital camera data on a video/TV  
8 receiver.

1           55. A digital camera comprising:  
2           (a) means for converting light to digital image data;  
3           (b) port means for receiving and sending digital data;  
4           (c) means for transmitting and receiving said digital  
5 data to and from a destination device by way of a  
6 communication network; and  
7           (d) means for automatically performing one or more  
8 programmed operations upon occurrence of a condition.

1           56. A digital camera as recited in claim 55 further  
2 comprising means for securing said digital image data.

1           57. A digital camera as recited in claim 56 wherein  
2 said programmed operations include said transmitting said  
3 data.



1           58. A communication device as recited in claim 1  
2 further comprising means for automatically performing a  
3 programmed operation upon occurrence of a condition.

1           59. A communication device as recited in claim 58  
2 wherein said programmed operation is receiving of image data  
3 from a camera and performing an operation in response to  
4 receiving said image data.

1           60. A communication device as recited in claim 58  
2 wherein said condition is an instruction received from a  
3 destination by way of said network.

1           61. A communication device as recited in claim 58  
2 wherein said condition is a specific time to perform said  
3 operation.

1           62. A communication device as recited in claim 58  
2 wherein said condition is slow traffic on the network.

1           63. A communication device as recited in claim 58  
2 wherein said operation is sending data to said network.

1           64. A communication device as recited in claim 58  
2 wherein said condition is a predefined amount of camera  
3 memory capacity available for storage of additional image  
4 data.

1           65. A communication device as recited in claim 58  
2 wherein said operation is receiving additional information  
3 from a remote destination.

1           66. A communication device as recited in claim 65  
2 wherein said additional information is for accompanying  
3 specific image data.

1           67. A communication device as recited in claim 65  
2       wherein said additional information is operational  
3       instructions.

1           68. A communication device as recited in claim 58  
2       wherein said operation is connecting to a network.

1           69. A communication device as recited in claim 58  
2       wherein said operation is disconnecting from a network.

1           70. A communication device as recited in claim 61  
2       wherein said operation is taking a picture.

1           71. A communication device as recited in claim 61  
2       wherein said operator is downloading said data to said  
3       destination device.

1           72. A communication device as recited in claim 61  
2       wherein said operation is uploading data from said  
3       destination device.

1           73. A communication device as recited in claim 72  
2       wherein said data includes a camera ID and account number.

1           74. A communication device as recited in claim 73  
2       wherein said operation further includes downloading said  
3       camera ID and account number upon occurrence of a second  
4       condition.

1           75. A communication device as recited in claim 1  
2       further comprising a ROM programmed for a specific purpose.

1           76. A communication device as recited in claim 75  
2       wherein said specific purpose is to restrict downloading to a  
3       specific destination.

1           77. A communication device as recited in claim 1

2 further comprising visual display means for indicating  
3 operation status.

1 78. A communication device as recited in claim 77  
2 wherein said display means indicates when said device is  
3 programmed to connect to a network, and indicate when a  
4 network connection is made to said device.

1 79. A digital camera as recited in claim 57 wherein  
2 said condition includes said camera receiving a signal from  
3 said remote destination.

1 80. A digital camera as recited in claim 57 wherein  
2 said condition includes said camera programmed to perform a  
3 said operation at a specific time.

1 81. A digital camera as recited in claim 57 wherein  
2 (a) said means for securing includes means for  
3 creating encrypted data from said digital image data;  
4 (b) said programmed operations further include said  
5 securing, and said transmitting; and  
6 (c) said digital data includes information to be  
7 transmittēd to said destination.

1 82. A digital camera as recited in claim 81 wherein  
2 said digital data includes  
3 (a) camera identification data; and  
4 (b) user identification data.

1 83. A method as recited in claim 40 further  
2 comprising:  
3 said communication device automatically responding to  
4 one or more conditions by performing one or more programmed  
5 operations.

1 84. A method as recited in claim 83 wherein  
2 (a) said programmed operation is said transmitting;

3 and  
4 (b) said condition includes a signal from said  
5 destination.

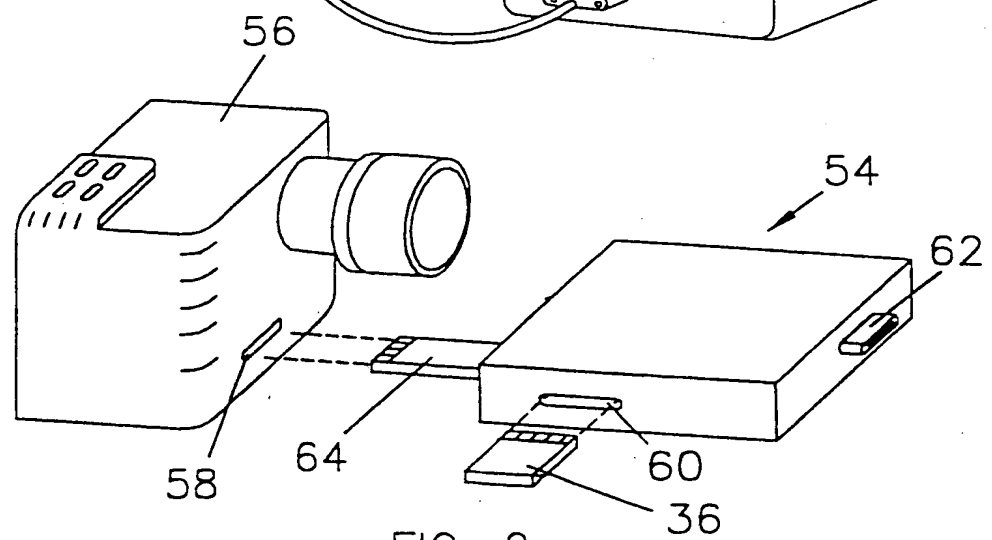
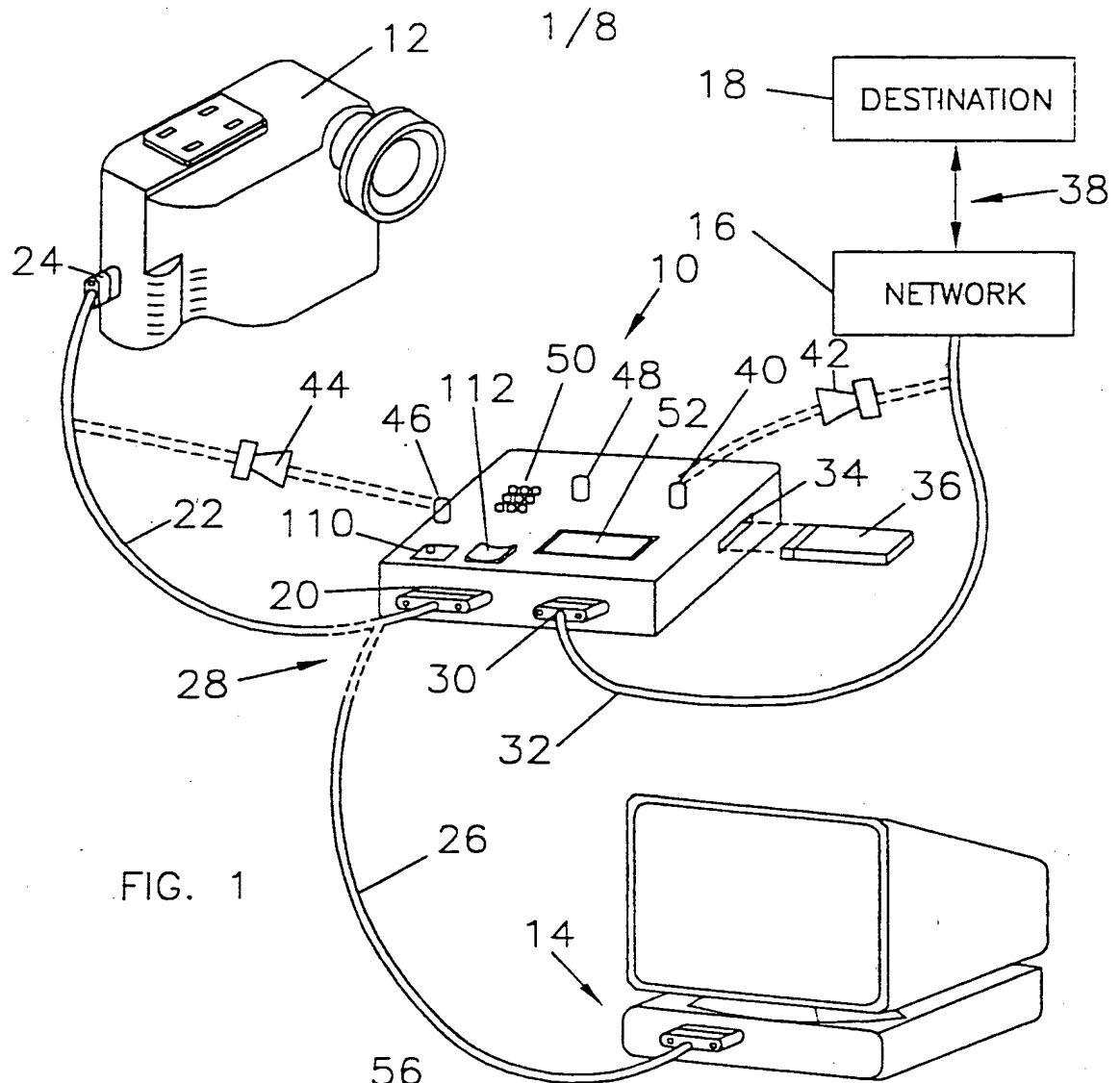
1 85. A communication device as recited in claim 1  
2 further comprising means for including identification of a  
3 camera that secured a particular image along with said data  
4 representing said particular image.

1 86. A digital camera as recited in claim 55 further  
2 comprising means for including identification of said camera  
3 along with said data representing said particular image.

1 87. A method as recited in claim 40 further comprising  
2 means for including identification of a camera that secured a  
3 particular image along with said data representing said  
4 particular image.

1 88. A method as recited in claim 40 further comprising  
2 means for including a unique number with each group of said  
3 digital data representing a particular image.

1 89. A digital camera as recited in claim 86 further  
2 comprising means for including a unique number with each said  
3 data representing said particular image.



2/8

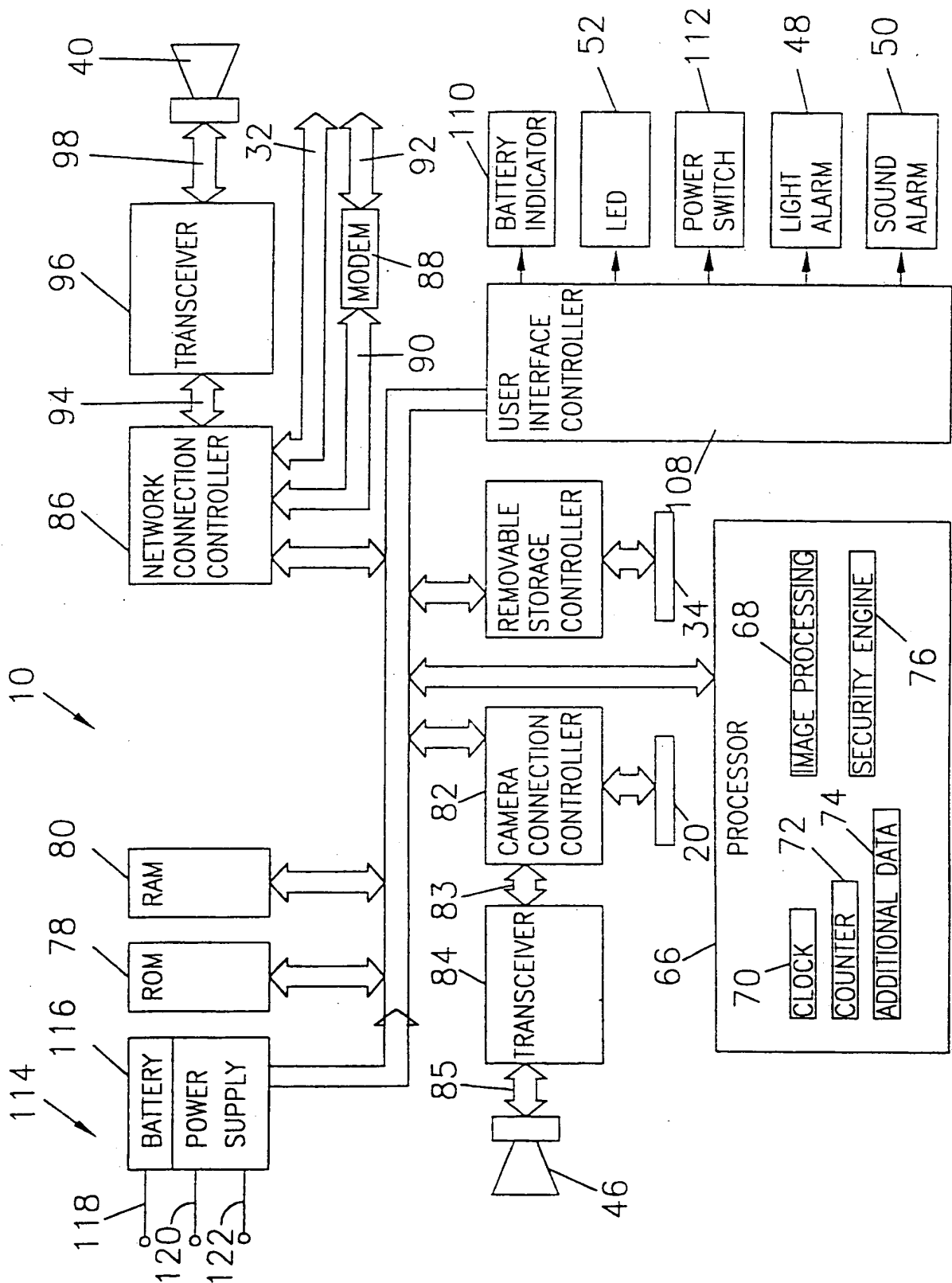


FIG. 3

SUBSTITUTE SHEET (RULE 26)

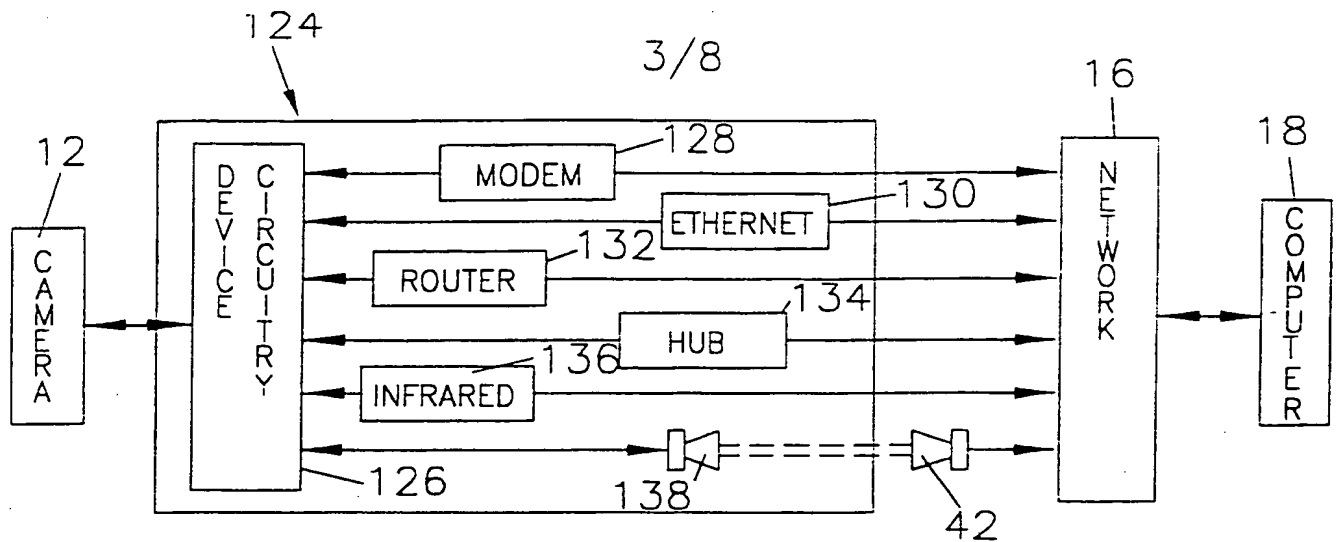


FIG. 4

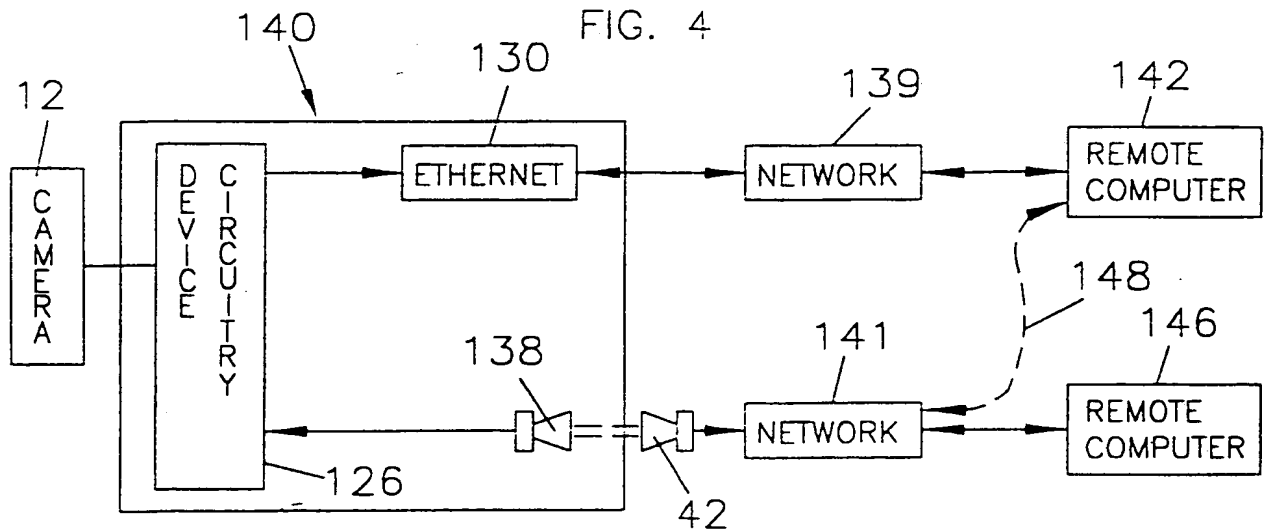


FIG. 5

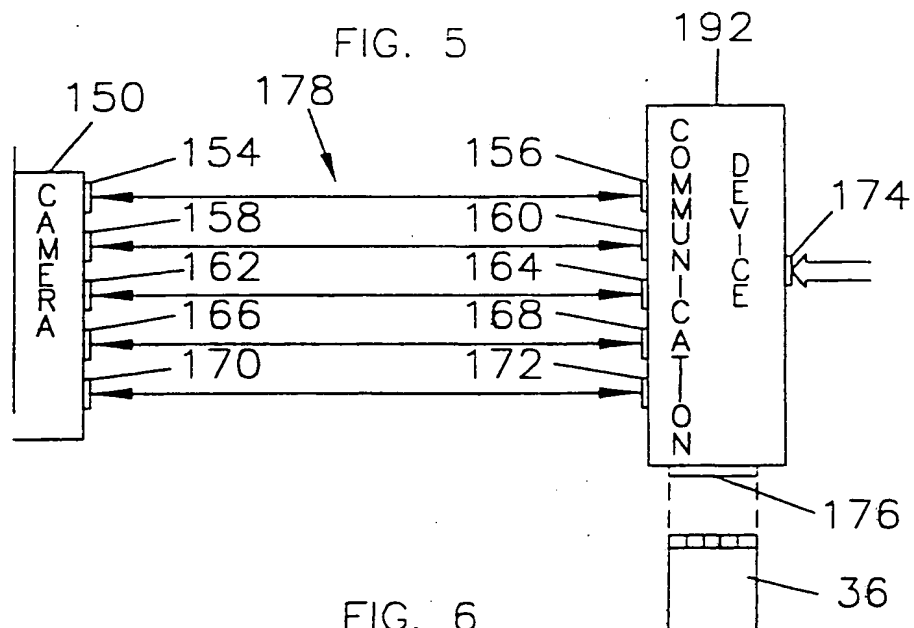


FIG. 6

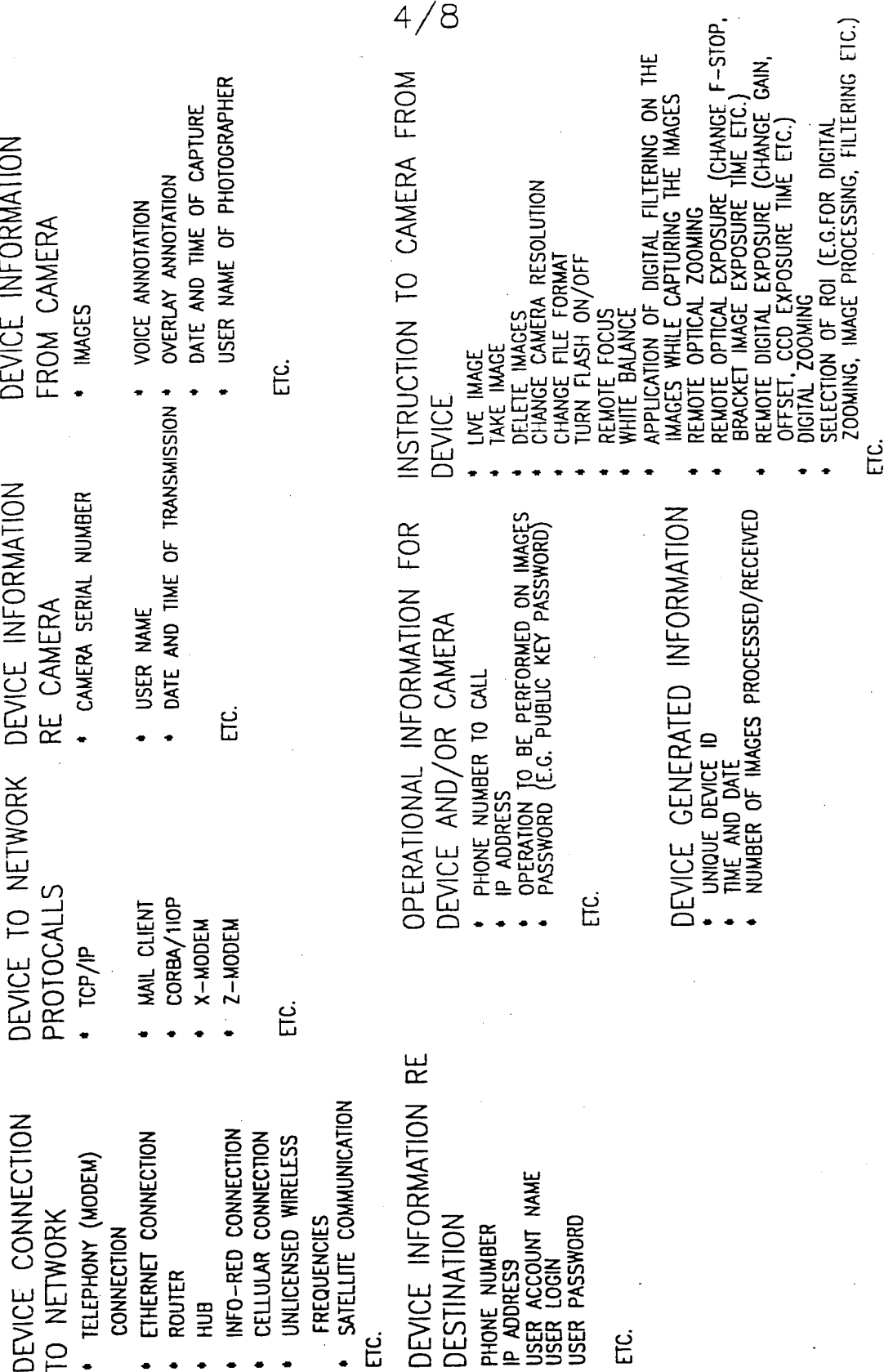


FIG. 7



5/8

## DEVICE OPERATIONS ON IMAGE DATA

## OPERATING ON FILES:

- COMPRESSING/EXPANDING FILES
- PARSING FILES AND CONVERTING TO DIFFERENT FORMATS

## PERFORMING IMAGE ENHANCEMENT OPERATIONS SUCH AS:

- AUTOMATIC COLOR CORRECTION
- RESAMPLING
- SHARPENING
- ROTATION
- GENERIC IMAGE FILTERING

ETC.

## ADDING IDENTIFIERS TO THE IMAGES SUCH AS:

- STAMPING THE DATE AND TIME ON THE IMAGE
- ADDING THE USER'S NAME
- ADDING CAMERA UNIQUE ID
- ADDING AN IMAGE UNIQUE ID
- ADDING THE TIME AND DATE OF TRANSMISSION

## SECURE THE IMAGE VIA:

- WATERMARKING IMAGES
- AUTHENTICATING IMAGES
- ENCRYPTION IMAGES

FIG. 8

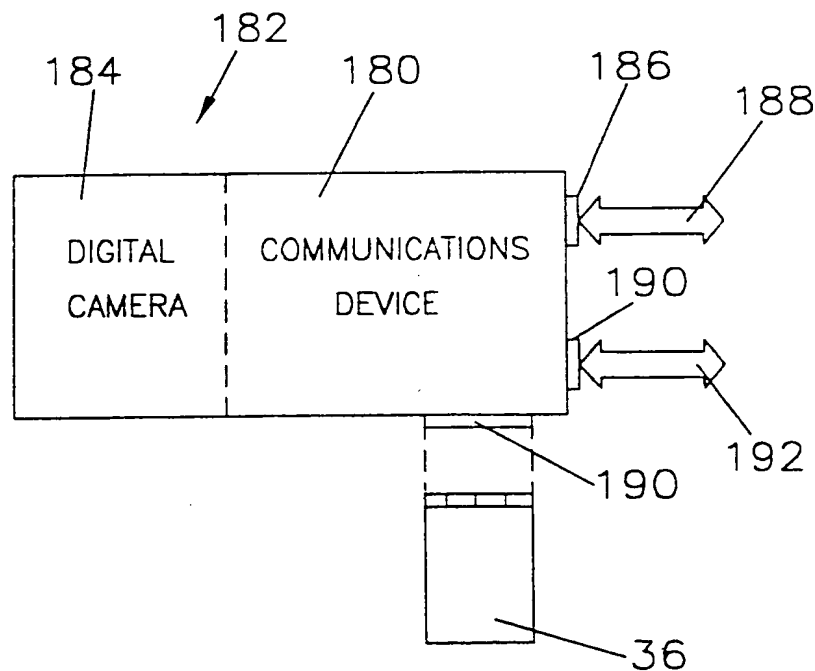


FIG. 9

6/8

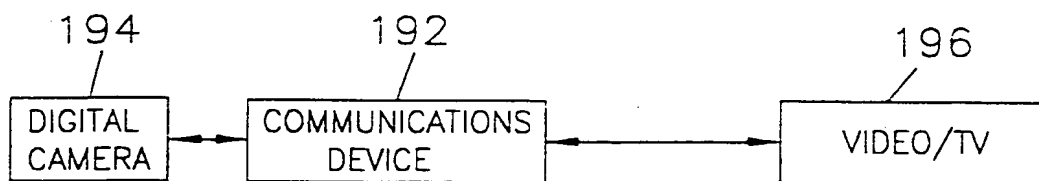


FIG. 10

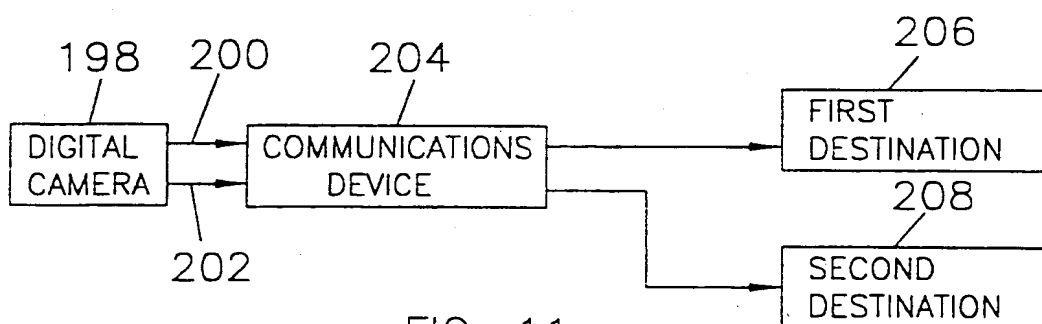


FIG. 11

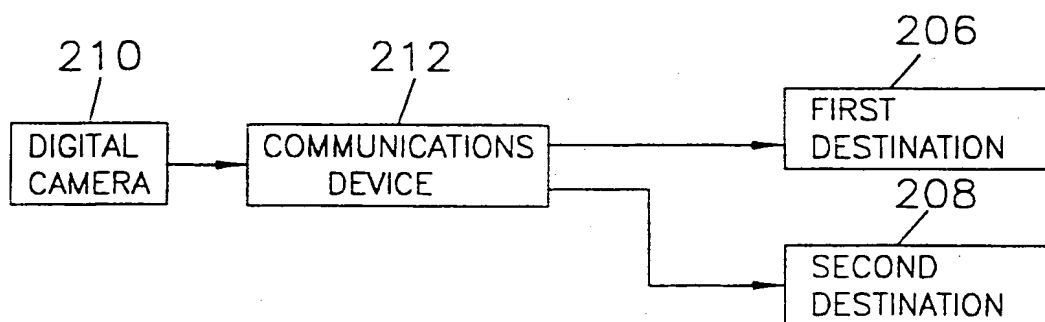


FIG. 12

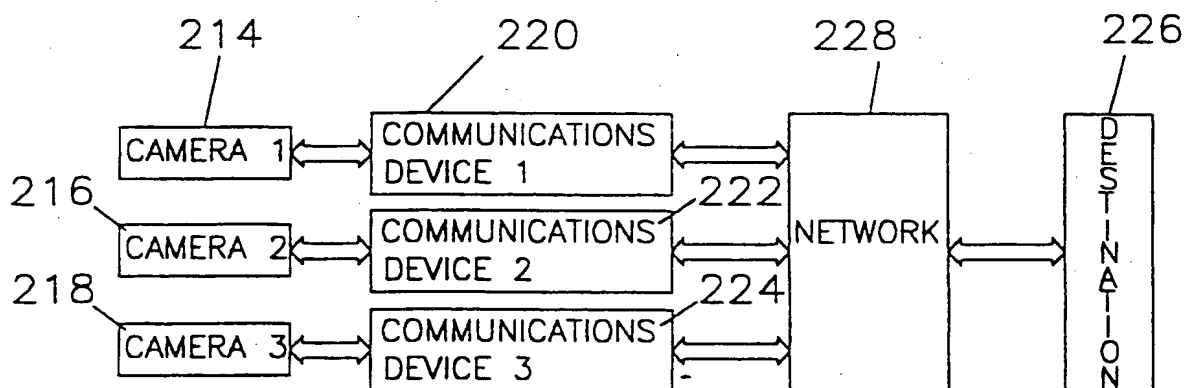


FIG. 13

7/8

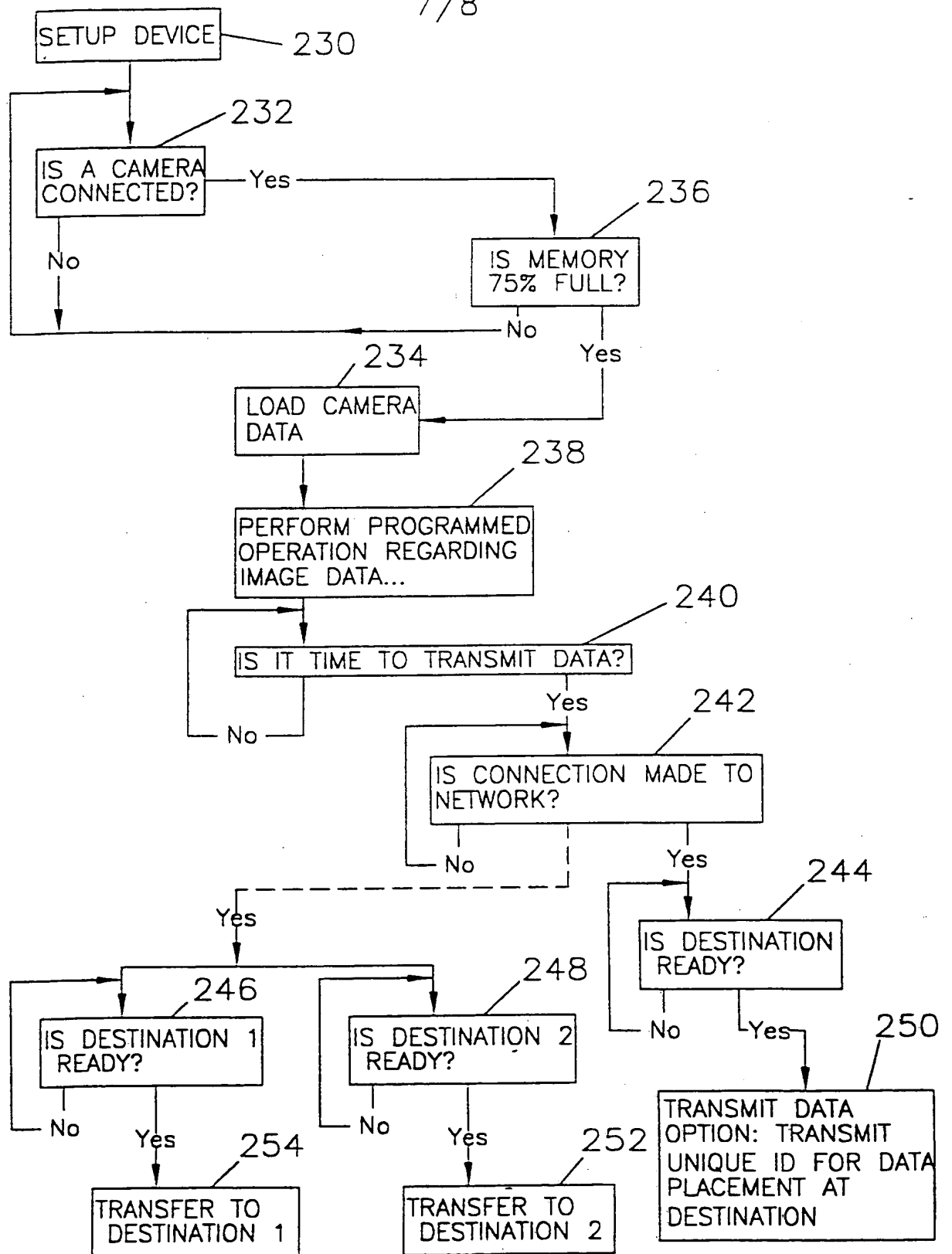


FIG. 14

8/8

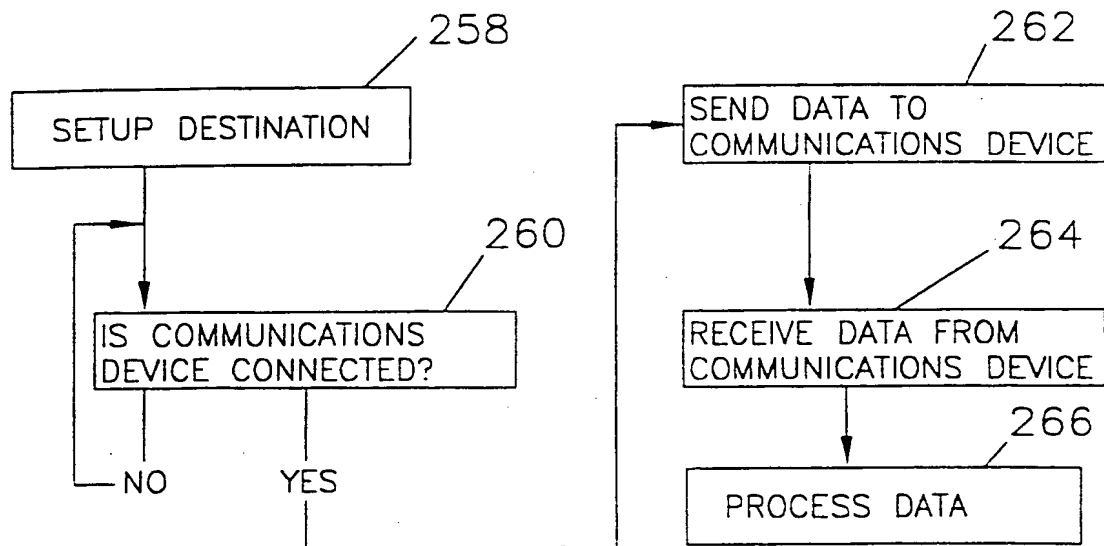


FIG. 15

DATA FROM DESTINATION TO DEVICE

1. TAKE A PICTURE AT A SET TIME OR AT INTERVALS.
2. FOR IMAGE HEADER, ETC.
  - A) ACCOUNT ID
  - B) TITLE
  - C) NAME , ADDRESS, ETC.
3. OPERATIONAL DATA
  - A) WHERE TO TAKE A PICTURE
  - B) MAP OF LOCATION
  - C. CORRECTIVE NOTICES
4. INSTRUCTION TO DOWNLOAD DATA

DATA PROCESSING DETINATION

1. ENCRYPT AND STORE DATA
2. DECRYPT DATA AND PRINT IMAGE
3. ARCHIVE THE IMAGE
4. SEND IMAGE DATA TO REMOTE LOCATION
5. PLACE IMAGE DATA ON THE WEB
6. SEND DATA BY E-MAIL WITH LOW RESOLUTION OF IMAGE
7. SEND DECRYPTED IMAGE TO A FIRST DESTINATION
8. SEND AUTHENTICATION DATA TO A SECOND DESTINATION
9. COMPARE QUESTIONABLE IMAGE DATA FROM A THIRD SOURCE WITH AUTHENTICATION DATA AND DISPLAY THE RESULT

FIG. 16

SUBSTITUTE SHEET (RULE 26)

CORRECTED VERSION

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
6 January 2000 (06.01.2000)

PCT

(10) International Publication Number  
WO 00/01138 A2

- (51) International Patent Classification<sup>6</sup>: H04N (81) Designated State (*national*): JP.
- (21) International Application Number: PCT/US99/10389 (84) Designated States (*regional*): European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).
- (22) International Filing Date: 11 May 1999 (11.05.1999)
- (25) Filing Language: English Published:  
— Without international search report and to be republished upon receipt of that report.
- (26) Publication Language: English
- (30) Priority Data: 09/105,594 26 June 1998 (26.06.1998) US (48) Date of publication of this corrected version: 22 March 2001
- (71) Applicant: FOTONATION, INC. [US/US]; 199 California Drive, Millbrae, CA 94030 (US). (15) Information about Correction: see PCT Gazette No. 12/2001 of 22 March 2001, Section II
- (72) Inventors: STEINBERG, Eran; 372 Douglas Street, San Francisco, CA (US). PRILUTSKY, Yury; 1426 Shoal Drive, San Mateo, CA 94404 (US). RAFFER, Scott, Neil; 1530 20th Street, San Francisco, CA 94107 (US). For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.
- (74) Agent: JAFFER, David, H.; Rosenblum, Paris & Isaacs, 15th floor, 160 West Santa Clara Street, San Jose, CA 95113 (US).

(54) Title: CAMERA NETWORK COMMUNICATION DEVICE

(57) Abstract: A communication device for interconnecting a digital camera to a communication network for downloading data to a remote computer. The device has a network communication port for establishing communication with a network via a pre-defined protocol and communication mode, and has a camera communication port such as a serial, parallel, SCSI, USB or Irda-port that imitates the back end application of a PC, for connection to a digital camera for sending and receiving data to and from the camera. The camera communication port is also used for input of programming and setup data to the communication device from a PC. The device can be programmed to operate on the data directly, such as in the case of data for storage or operational direction, and/or direct the data to the camera. The device may also have a Smart card socket into which a user can insert a card to input data, such as user and camera I.D., user authorization, image marking, camera operational parameters, remote computer/destination address, etc. The device can be programmed to perform encryption, authentication, watermarking and fingerprinting procedures, as well as structuring the data for transmission over a particular network, and to automatically perform operations, such as at specific times or in response to data input.

WO 00/01138 A2

## CAMERA NETWORK COMMUNICATION DEVICE

BACKGROUND OF THE INVENTIONField of the Invention

The present invention relates generally to digital still and video cameras and communication systems, and more particularly to a communication device providing a communication interface between a digital camera and a network system.

Brief Description of the Prior Art

Portable digital cameras are generally treated as PC peripheral devices. With conventional digital cameras, a user takes pictures until the camera memory/disk is filled and then downloads the digital image data to a PC. The camera needs to be either connected to the PC, for example through a cable, or a removable storage device such as a PCMCIA card must be manually transferred from the camera to the PC. The need to regularly make a direct, physical connection to a PC reduces the portable nature of digital cameras. In addition, downloading images to a PC is a local operation. In order to move images into the internet, the user must apply another set of commands on the local PC. Such a system is described in U.S. Patent No. 5,475,441 by Parulski et al. Cameras are also incorporated into integrated systems for displaying an image, such as a visual surveillance system in a retail store. U.S. Patent No. 5,444,483 by Maeda discloses a system including a digital camera with processing circuitry for display on a television screen.

Another limitation of conventional digital cameras is that there is no direct way to identify an image once it is loaded onto the PC. Additional information must be added manually, such as operator name, account number, camera of origin, etc. Also, there is no way of securing the images to assure that an operator does not alter them once loaded into a PC, or that the images will not be viewed by an unauthorized person as part of the transmission of the images from the PC to a remote location.

1  
2                   SUMMARY OF THE INVENTION

3           It is therefore an object of the present invention to provide  
4 an apparatus to serve as an interface for enabling a user of a  
5 portable still and or video digital camera to send image data  
6 directly from the camera to a communication network for  
7 transmission and downloading to a remote network location or  
8 remote computer.

9           It is a further object of the present invention to provide an  
10 apparatus enabling a user of a conventional digital camera  
11 designed to only download directly to a PC, to send camera data  
12 directly from the camera to a communication network for  
13 transmission and downloading to a remote network location or  
14 remote computer.

15           It is a still further object of the present invention to  
16 provide an apparatus that performs operations to secure the camera  
17 data against unauthorized use during transmission through an  
18 insecure communications network, and storage in an otherwise  
19 unsecure remote destination.

20           It is a still further object of the present invention to  
21 provide an apparatus for downloading image data from a variety of  
22 digital cameras to a remote computer through a selected  
23 communication network by means of an interface selected from a  
24 group, including but not limited to a modem, an ethernet adapter,  
25 a router, a hub, or infrared and other wireless connection.

26           It is another object of the present invention to provide an  
27 apparatus that can receive and encrypt and/or mark image data from  
28 a camera and transmit the encrypted/marked data to a remote  
29 computer.

30           It is another object of the present invention to provide an  
31 apparatus that can receive image data from a camera and transmit  
32 the data to a remote computer along with additional annotation  
33 data including but not limited to time and date, user information,  
34 location information, and camera information.

35           It is an object of the present invention to provide an  
36 apparatus for connecting a digital camera output to a remote  
37 computer, the apparatus being responsive to a Smart Card to

1 program the apparatus and the camera, and to allow an authorized  
2 user to operate the apparatus.

3 It is another object of the present invention to provide an  
4 apparatus for use with a digital camera, that can control the  
5 camera by means of programming, or in response to  
6 information/direction from a remote computerized destination.

7 It is another object of the present invention to provide an  
8 apparatus for use with a digital camera, that can be programmed by  
9 a PC using the same interface on the apparatus that would later be  
10 used to communicate with the camera.

11 It is a still further objective of the present invention to  
12 provide a still and or video digital camera capable of downloading  
13 image data to a remote computer through a selected communication  
14 network by means of an interface selected from the group including  
15 but not limited to a modem, an ethernet adapter, a router, a hub,  
16 or infrared or other wireless connection.

17 It is another objective of the present invention to provide a  
18 digital camera, and a device for use with a digital camera, that  
19 automatically performs operations dependent on camera or device  
20 programming, or in response to information/direction from a remote  
21 computerized destination.

22 It is another object of the present invention to provide an  
23 apparatus for use with a digital camera, that can control the  
24 camera by means of programming, or in response to  
25 information/direction from a remote computerized destination.

26 It is another objective of the present invention to provide  
27 an apparatus for use with a digital camera, that can be programmed  
28 by a PC using the same interface on the apparatus that would later  
29 be used to communicate with the camera.

30 It is a still further objective of the present invention to  
31 provide a still and or video digital camera capable of downloading  
32 image data to a remote computer through a selected communication  
33 network by means of an interface selected from the group including  
34 but not limited to a modem, an ethernet adapter, a router, a hub,  
35 or infrared or other wireless connection.

36 It is another objective of the present invention to provide a  
37 digital camera, and a device for use with a digital camera, that



1 automatically performs operations dependent on camera or device  
2 programming, or in response to information/direction from a remote  
3 computerized destination.

4 Briefly, a preferred embodiment of the present invention  
5 includes a communication device for interconnecting a digital  
6 camera to a communication network for downloading data to a remote  
7 computer. The device has a network communication port for  
8 establishing communication with a network via a pre-defined  
9 protocol and communication mode, and has a camera communication  
10 port such as a serial, parallel, SCSI, USB or Irda-port that  
11 imitates the back end application of a PC, for connection to a  
12 digital camera for sending and receiving data to and from the  
13 camera. The camera communication port is also used for input of  
14 programming and setup data to the communication device from a PC.  
15 The device can be programmed to operate on the data directly,  
16 such as in the case of data for storage or operational direction,  
17 and/or direct the data to the camera. The device may also have a  
18 Smart card socket into which a user can insert a card to input  
19 data, such as user and camera I.D., user authorization, image  
20 marking, camera operational parameters, remote  
21 computer/destination address, etc. The device can be programmed  
22 to perform encryption, authentication, watermarking and  
23 fingerprinting procedures, as well as structuring the data for  
24 transmission over a particular network, and to automatically  
25 perform operations, such as at specific times or in response to  
26 data input.

27 An advantage of the present invention is that a digital  
28 camera user can download image camera data to a remote computer or  
29 network site and therefore avoid the concern of the need to  
30 connect the camera or its removable device to a local computer in  
31 order to perform such operation.

32 Another advantage of the present invention is that it gives  
33 the camera user the capability of automatically securing the  
34 camera data, for example by encrypting or marking the data prior  
35 to sending it over a communication system and downloading it to a  
36 computer.

37 Another advantage of the present invention is that it adds

1 functionality to cameras that are not designed specifically to  
2 perform the task of connection to a remote network.

3 A further advantage of the present invention is that it  
4 provides an apparatus with a connection to a camera that is  
5 programmable for customized operations.

6 Another advantage of the present invention is that it  
7 provides an apparatus that enables a user to send data from a  
8 digital camera through a network to a plurality of destinations of  
9 a variety of types, such as network printers and remote archives.

10

11

#### IN THE DRAWING

12 Fig. 1 illustrates the communication device of the present  
13 invention interconnected to a camera and communication network;

14 Fig. 2 illustrates a device that connects to a camera through  
15 a removable card interface;

16 Fig. 3 is a block diagram of the communication device;

17 Fig. 4 illustrates the communication device connected to a  
18 network through one or more types of network connections;

19 Fig. 5 illustrates a communication device connected to more  
20 than one network;

21 Fig. 6 demonstrates various ways of interconnecting the  
22 communication device to a camera;

23 Fig. 7 summarizes various programming and operational  
24 options;

25 Fig. 8 summarizes various operations that the communication  
26 device can perform on images;

27 Fig. 9 shows an alternate embodiment wherein the  
28 communication device is integrated with a camera;

29 Fig. 10 illustrates an embodiment of the present invention  
30 wherein a communication device is configured for connecting data  
31 from a camera directly to a video/TV receiver;

32 Fig. 11 illustrates a communication device configured for  
33 sending different data to separate destinations;

34 Fig. 12 illustrates a communication device configured for  
35 distinguishing two sets of data and sending one set to one  
36 location and another to a second location.

37 Fig. 13 illustrates a plurality of cameras each communicating

1 through a communication device to a single destination;

2 Fig. 14 is a flow chart illustrating automation related to  
3 the communication device;

4 Fig. 15 is a flow chart illustrating automation related to  
5 the destination device;

6 Fig. 16 presents summaries of types of data that can be sent  
7 from the destination to the communication device, and processing  
8 that can be done by the destination; and

9 Fig. 17 is a flow chart illustrating automation in a camera  
10 having a built-in communication device.

11

12 DESCRIPTION OF THE PREFERRED EMBODIMENT

13 Referring now to Fig. 1 of the drawing, a preferred  
14 embodiment of the communication device 10 of the present invention  
15 is illustrated in use with a digital camera 12, PC 14,  
16 communication network 16 and a remote destination 18, which can be  
17 any type of network object, such as a PC, a printer, phone switch,  
18 server, etc. The device 10 has a camera communication port 20 for  
19 interconnection to either the camera 12 as indicated by cable 22  
20 to port 24, or to the PC 14 through cable 26. The dashed lines 28  
21 are to indicate that either the camera 12 or PC 14 can be  
22 connected to port 20. The device 10 has a network communication  
23 port 30 shown connected to the network 16 through line 32, and a  
24 Smart card port 34 for installation of a Smart card 36. The  
25 connection between the remote destination 18 to the network 16 is  
26 indicated by line 38. The communication device 10 includes any of  
27 various communication or network apparatus for sending data  
28 through the network 16.

29 The use of the communication device 10 involves first  
30 programming it as required. Programming is accomplished through  
31 use of a PC 14 connected to port 20 and/or through data entry from  
32 the Smart card 36 through the port 34 and/or from a remote  
33 computer at destination 18 by way of the network 16. Examples of  
34 programming options will be given in the following detailed  
35 description. Generally, the device 10 can be programmed to send  
36 instructions and data to the camera and to perform operations on  
37 data received from the camera, and to send data to the specified

1 remote destination 18 by way of the network 16. Typical uses of  
2 the Smart card are for entry of additional data such as a user  
3 I.D., camera ID, an address or phone number of the remote  
4 destination/network site 18, operational instructions to the  
5 camera 12 and communication device 10, etc.

6 The primary function of the communication device 10 is to  
7 perform the necessary operations required to receive data from the  
8 camera 12 and then to send the data to the remote destination 18  
9 by way of a selected communication media indicated by network 16.  
10 Other operations/functions will be described in the following  
11 specification.

12 The input 20 of the device 10 imitates the back end  
13 application of a PC, thus becoming transparent to the camera that  
14 operates as if it is communicating to a PC. The communication  
15 device 10 establishes communication with a network 16 via a pre-  
16 defined protocol and communication mode. The device 10 receives  
17 image data and other information data from a camera 12, and  
18 secures the data and structures it according to the required  
19 protocol, performs any other programmed operations, and then sends  
20 the data through the network for transmission to a destination  
21 device 18, such as a computer, printer, server, phone switch,  
22 etc., placing the data in assigned locations as defined by the  
23 device ID or commands. Communication between the device 10 and  
24 the destination device can be bi-directional, i.e. a destination  
25 device host 18 can download information to the communication  
26 device 10 as well as receive information. Any and all types of  
27 media are included in the spirit of the present invention.  
28 Particular embodiments of the communication device 10 include the  
29 functions of one or more devices including a telephone modem,  
30 ethernet adapter, a router, hub, etc. The device 10 can also be  
31 configured to transmit through a wireless communication link, such  
32 as satellite communication, etc. Signals include infrared, or any  
33 RF frequency such as UHF, VHF, or microwave.

34 In wireless communication between the device 10 and  
35 destination 18, line 32 is replaced with a wireless connection  
36 between the device 10 and the network 16, as indicated by  
37 antenna/emitter 40 on the communication device 10 and transceiver

1 42 connected to the network 16.

2 Fig. 1 also shows wireless communication between the camera  
3 12 and communication device 10, indicated by a transceiver 44  
4 connected to the camera port 24, and an antenna/emitter 46 on the  
5 communication device 10 for sending and receiving data between the  
6 camera 12 and device 10. All types of radiated signals are  
7 included in the spirit of the invention, the particular type  
8 depending on such factors as distance and environment, etc.

9 Because the device 10 is programmable, there is significant  
10 flexibility in its use. For example, device 10 can be programmed  
11 to perform functions automatically, for example to receive  
12 instruction from a destination device/host computer 18 to direct  
13 the camera to take a picture at a particular time of day, or every  
14 hour and/or to download images or upload information at a specific  
15 time from the camera. The device 10 can be programmed by a  
16 destination device 18 to operate a camera "off-line". After  
17 uploading the instruction to the device 10, the communication can  
18 be terminated. The device 10 can keep the instructions and send  
19 them to the camera appropriately.

20 In another example, the device 10 can be programmed to  
21 automatically connect to the network 16 when the camera image data  
22 storage is full, or partially full, and then to download the image  
23 data and subsequently disconnect from the network 16. Upon  
24 completion of downloading and receiving a confirmation from the  
25 destination 18, the device 10 can continue by deleting the image  
26 data from the camera.

27 The communication device 10, or camera if it is programmable,  
28 can also be loaded with information to accompany an image, and  
29 this information can be included, for example, in an image header.  
30 Examples of valuable information may include an account number and  
31 a camera ID. The device 10 can be programmed to automatically  
32 include this information with image data downloaded to a  
33 destination. Such identification avoids confusion as to the  
34 source of the image.

35 The communication device is designed with selected features  
36 permanently programmed. An alternate embodiment of the present  
37 invention includes permanent programming to allow downloading of

1 data only to a specific destination. Such fixed programming helps  
2 avoid theft of the device or camera for a different use. In  
3 general, it is a specific feature of the present invention to  
4 provide a device with permanent programming for any specific  
5 purpose.

6 Another alternate embodiment includes fixed programming to  
7 automatically request and receive a camera ID from the destination  
8 device 18, and/or smart card 36 when connected to either of these.  
9 The camera ID is then included along with image data. A still  
10 further embodiment includes permanent programming to read and  
11 increment a counter and assign a unique number to each image  
12 received. In this way each image has associated with it a unique  
13 number, and the ID of the camera that secured the image. The  
14 programming for these functions will be understood by those  
15 skilled in the art, and is not shown. The required clock,  
16 counter, ROM and other necessary circuit components are  
17 illustrated in block form in Fig. 3. In an embodiment wherein the  
18 communication device is integrated with a digital camera, the  
19 camera ID is programmed into ROM, and therefore no additional  
20 request or receiving of a camera ID is required. The operation of  
21 including an image number is accomplished in the same manner as  
22 with the separate communication device. The integrated camera and  
23 communication device will be more fully described in the following  
24 text in reference to Fig. 9 of the drawing.

25 Other embodiments of the communication device 10 include the  
26 incorporation of visual 48 and sound 50 indicators to inform a  
27 user concerning operations that need to be accomplished. These  
28 can function either off or on line. For example, the alarm/sound  
29 indicator 50 can be programmed to sound, and/or the visual  
30 indicator can light if the device 10 is programmed to connect the  
31 camera to the network at a specific time and there is no  
32 connection. The indicators can also give notice when the image  
33 storage has reached a certain level. A visual display 52 is  
34 optional for presentation of useful information such as the  
35 remaining number of images to be sent to a destination 18, the  
36 remaining time required for transmission, notice of connection to  
37 a camera 12, and notice of connection to a destination 18.

1 Internally, the device 10 includes a counter to maintain the image  
2 count for display as discussed above, and may optionally also  
3 include a clock for use in indicating the date and time of  
4 receiving an image on the display 52.

5 An alternate construction 54 of a device that is functionally  
6 similar to device 10 is shown in Fig. 2 wherein the connection  
7 from the device 54 to a camera 56, or to the PC 14 is made through  
8 a removable storage interface such as a PCMCIA card, SamrtMedia  
9 CompactFlash Klik! Card, etc. For example, a PCMCIA card 36 can  
10 be placed in the camera card slot 58 and camera data can be  
11 downloaded to the card 36. The card 36 can then be placed in the  
12 device 54 slot 60, and the camera data can be loaded into the  
13 device 54 for processing and transmission through connection 62 to  
14 a destination 20. An alternate embodiment is also indicated in  
15 Fig. 2, wherein a PCMCIA card extension 64 is provided for  
16 installation in the PCMCIA card slot 58 of the camera 56. Other  
17 configurations and types of connections in the design of the  
18 communication device will be apparent to those skilled in the art  
19 and these are to be included in the spirit of the present  
20 invention.

21 Referring to Fig. 3, the internal structure of the  
22 communication device 10 is shown in block form. A processor 66  
23 performs operations according to specific programming generally  
24 indicated by the image processing block 68, and coordinates the  
25 activation of the communication device 10. Specifically noted in  
26 the processor block 66 are the operations of maintaining the time  
27 and date (clock 70), for inclusion with image data to indicate the  
28 time and date of the image processing. The processor also keeps an  
29 account of the number of images received and sent (block 72), for  
30 display on the LED screen 52, and processes additional data (block  
31 74) for various purposes, including user data to be included with  
32 image data. In addition, the processor performs security  
33 operations when programmed to do so (block 76). Typically, a ROM  
34 78 is provided to store permanently programmed data, and a RAM 80  
35 is used for temporary storage. Specific camera communication  
36 apparatus includes a camera connection controller 82, and an  
37 optional infrared transceiver 84 for a wireless connection to the

1 camera. The camera controller 82 connects to the camera through  
2 port 20 and/or the transceiver 84, and additional connective  
3 hardware as indicated in Fig. 1. The network communication  
4 apparatus similarly includes, in addition to the processor and  
5 memory blocks, a network connection controller 86, communicating  
6 with the network through line 32 and/or connected to a modem 88  
7 through bus 90 and then to the network through a modem output bus  
8 92 and/or a bus 94 to a transceiver 96 to the antenna/emitter 40  
9 via a bus 98 for a wireless connection to the network. Similarly,  
10 the camera connection controller is optionally connected via bus  
11 10 to a transceiver 102 connected through bus 104 to  
12 antenna/emitter 46 for communication with the camera 12. The user  
13 indicators are operated through a user interface controller 108.  
14 The indicators include a battery condition indicator 110, the  
15 alarm light 48, the sound alarm 50, a power switch 112, and the  
16 LED display 52. The power supply 114 is also indicated with  
17 options including a battery 116, an AC battery charging supply  
18 input 118, a phone line power connection 120 and a line 122 from  
19 an alternate power bus, not shown.

20 Fig. 4 illustrates accommodation of a number of types of  
21 network connections with a single communication device 124,  
22 including device circuitry 126 similar to that shown in Fig. 3,  
23 including a modem 128 and also an Ethernet adapter 130, a router  
24 132, a hub 134, an infrared link 136 and/or any wireless  
25 connection 138. The device 124 can be configured to provide  
26 compatible data format for any one or more of the possible types  
27 of network connections, either individually or simultaneously. In  
28 the case of simultaneous output to more than one media, the device  
29 124 includes a separate output for each type of connection. The  
30 various selected connection types can each transmit through a  
31 corresponding part of network 16 to a single computer or remote  
32 network node 18, or they can each output to a different remote  
33 destination, such as illustrated in Fig. 5 where output from a  
34 camera 12 is sent by a communication device 140 by way of an  
35 ethernet adapter 130 through a network 139 to a first remote  
36 computer 142, and also by way of a wireless connection/transceiver  
37 138 to a transceiver 42, through a network 141 to a second remote



1 computer 146, or alternately to the computer 142 as indicated by  
2 line 148.

3 The communication devices described in this disclosure can be  
4 connected to a camera by any of a variety of port types. This is  
5 illustrated in Fig. 6 showing a camera 150 connected to a  
6 communication device 152 by way of serial ports 154, 156, SCSI  
7 ports 158, 160, IrDa ports 162, 164, parallel ports 166, 168 and  
8 USB ports 170, 172 from communication device 152 to the camera  
9 150. The device 152 can have any combination of outputs and other  
10 features as described for communication devices elsewhere in this  
11 disclosure. As shown, the device 152 has an output port 174 and  
12 an optional Smart card port 176 for use with a Smart card 36. The  
13 various interconnecting lines or media are simply noted as lines  
14 178, each configured appropriately for the type of port. In the  
15 case of infrared communication the corresponding line 178 is not a  
16 physical communication cable but rather an unobstructed line of  
17 view. The camera and communication device can have one or more of  
18 the ports shown in Fig. 6. The spirit of the present invention  
19 includes other communication lines or media between the camera and  
20 communication device in addition to those shown in reference to  
21 Fig. 6, and between the communication device and a remote computer  
22 in addition to those illustrated in reference to Fig. 4. Such  
23 variations will be apparent to those skilled in the art.

24 As discussed above, the communication device of the present  
25 invention provides downloading of camera images onto computerized  
26 systems in an automated manner. The communication device is  
27 programmed to include information about the camera, the remote  
28 computer and intervening network and the corresponding method of  
29 transporting the information.

30 In addition to these more general features of the  
31 communication device, numerous programming and operational options  
32 are included in the spirit of the present invention, examples of  
33 which are given in the lists of Fig. 7. The types of connections  
34 from the communication device to a network were illustrated in  
35 detail in Fig. 4. These options are also listed in Fig. 7 under  
36 the heading "Device Connection to Network". Such connections  
37 require specific ordering/arranging of data known as protocols.

1 Typical protocols are listed in Fig. 7 under "Device to Network  
2 Protocols". A user will also often find it convenient to include  
3 the camera serial number or any other unique identification, along  
4 with the image information. Certain types of camera information  
5 are listed under "Device Information Re Camera", and this and  
6 other camera information are programmed into a device by use of  
7 the Smart card installed for example in port 34 of Fig. 1, or by  
8 use of a PC by way of port 20, or from a remote computer at 18 as  
9 illustrated in Fig. 1, or by other means that will be apparent to  
10 those skilled in the art.

11 In the same way, information regarding the identity by the  
12 particular communication device, and other information can be  
13 programmed into the device. Examples include a unique  
14 communication device ID, the date and time maintained by a built-  
15 in clock, the number of images stored and/or downloaded, and the  
16 numbers retained on a consecutive image counter in the  
17 communication device. These features are also listed in Fig. 7  
18 under DEVICE GENERATED INFORMATION.

19 The communication device is also programmed with information  
20 concerning the destination 18, which normally will be a remote PC,  
21 but could be some other apparatus such as a video monitor or a  
22 printer, etc. This type of information is listed under "Device  
23 Information Re Destination" in Fig. 7.

24 Requiring a user password avoids the possibility that an  
25 unauthorized person will alter data. Phone number and IP address  
26 data can also be loaded into the communication device, and are  
27 listed under "Operational Information for Devices and/or Camera"  
28 in Fig. 7. Detailed examples of operations to be performed on  
29 images will be discussed in reference to Fig. 8.

30 The communication device programming also includes  
31 instructions that are then sent by the communication device to the  
32 camera, examples of which are listed in Fig. 7 under "Instruction  
33 to Camera From Device".

34 The purpose of the communication device is to receive  
35 information from the camera and then to store it, or modify it,  
36 and/or add to it according to the program and data, and send the  
37 required data to the network. Examples of data received from the

1 camera are listed in Fig. 7 under "Device Information From  
2 Camera". Examples of operations performed on image data are  
3 included in the list of Fig. 8. A particular embodiment includes  
4 the device programmed to add identifiers to the image, such as  
5 including the date and time of image acquisition, the user's name,  
6 a unique camera I.D. or image I.D. and the date and time of  
7 transmission. This data can be placed on the image, or in an  
8 image header, or outside the image area. The communication device  
9 can also be programmed to mark, i.e. watermark or finger print,  
10 which are invisible marks, the images for the purpose of deterring  
11 unauthorized use, and/or it can be programmed to prepare image  
12 authentication data, or to encrypt the entire set of image data to  
13 prevent any unauthorized person from viewing the image. For  
14 example, the communication device can be programmed to store and  
15 encrypt selected image data points for comparison with data from  
16 corresponding locations of a questionable image at a later time.

17 It is noted in Fig. 8 that the device can also perform other  
18 operations such as compressing or expanding files, and parsing  
19 files and converting them to different formats.

20 The specific items listed in Figs. 7 and 8, and discussed  
21 above concerning programming of the communication device are all  
22 given by way of example. The basic objective of the present  
23 invention is to provide a communication device that will allow a  
24 digital camera to be connected to one or more types of  
25 communication networks for downloading of data to, and receiving  
26 data from a remote destination, which is typically a computer.  
27 Details of the circuitry and programming of the communication  
28 device do not need to be described in this disclosure because  
29 those skilled in the art of digital apparatus will understand how  
30 to design the device to perform the operations disclosed and  
31 claimed herein.

32 The embodiments of the present invention illustrated above  
33 are preferred embodiments. The communication device is  
34 particularly useful in these forms in that it allows existing  
35 digital cameras that do not have the functionality to connect to a  
36 network, to be connected to any of a variety of communication  
37 networks for transmission of image data and receiving

1 instructions. Existing digital cameras do not have to be modified  
2 to function with the communication device of the present invention  
3 because an interconnection is made through an existing camera port  
4 using the existing protocol.

5 An alternate embodiment of the present invention is  
6 illustrated in Fig. 9 wherein a communication device 180 is  
7 integrated inside a digital camera 182 containing a digital camera  
8 section 184. The novel digital camera 182 can send and receive  
9 data to and from a communication network. The camera 182 in this  
10 embodiment has a serial port 186 for connection to a line 188 to a  
11 PC for receiving programming data, for use in a downloading image  
12 data directly to a PC, as in a conventional digital camera. The  
13 camera 182 also has one or more communication ports 190 for  
14 connection to one or more lines 192 to a communication network.  
15 The network communication options discussed for example in  
16 reference to Figs. 4 and 5 also apply to the device 180 of Fig. 9.  
17 The operation of the device portion 180, and various features such  
18 as the display, indicators, etc. are the same as discussed above  
19 in regard to the external communication devices such as 10 or 124.  
20 Port 190 is for acceptance of a Smart card 36. Other optional  
21 features are not repeated in Fig. 9 for simplicity and to avoid  
22 redundant discussion.

23 Fig. 10 illustrates an embodiment of the invention wherein a  
24 communication device 192 is configured for connecting data from a  
25 camera 194 directly to a video/TV receiver 196. This connectivity  
26 allows both preview of live images from the camera as well as  
27 post-view or playback of either still images, or video when  
28 applicable.

29 Figs. 11 and 12 illustrate communication devices that are  
30 configured for transmission to separate destinations. Fig. 11  
31 illustrates a case where the camera 198 is capable of outputting  
32 first and second sets of data on lines 200 and 202 respectively,  
33 to a communication device 204, and wherein it is desirable to send  
34 a first set of data to a first destination 206 and a second set of  
35 data to a second destination 208. For example, a journalist may  
36 want to send high resolution data to his private PC at destination  
37 206 and send low resolution data to a potential customer for

1 preview at destination 208 prior to placing a purchase order for  
2 the image.

3 Other applications include "escrow" security transmissions  
4 where images "first data" are sent to a first location 206, and  
5 other information "second data" is automatically sent to a  
6 second location/recipient 208. In the case of secured images, an  
7 authenticated image can be sent to a first location such as 206  
8 and an image signature and/or authentication data can be sent to a  
9 second location 208. Similarly, encrypted or watermarked data can  
10 be sent to a first location, and original data to a second  
11 location.

12 In the case where the camera cannot provide both the first  
13 and second data, the second data can be prepared by the  
14 communication device, as illustrated in Fig. 12. In this case,  
15 the camera 210 only outputs original image data. The  
16 communication device 212 is programmed to create encrypted image  
17 data and/or authentication data, or include other data, and then  
18 output first selected data to a first destination/location 206 and  
19 a second set of data to location/destination 208.

20 As referred to in the above description, the device of the  
21 present invention performs operations in an automated manner.  
22 Novel methods of operation of the communication device and/or  
23 integrated camera device will now be described in greater detail.

24 The communication devices described above, used in a system,  
25 for example the system described in Fig. 1 wherein a programmable  
26 communication device 10 interconnects a camera 12 with a  
27 destination 18, or a similar system with a communication device  
28 integrated with a camera as described in reference to Fig. 9,  
29 provide a structure capable of automatic and intelligent  
30 operation. The computerized destination 18 can be of various  
31 configurations, including a single PC or a network server.

32 The method and apparatus of the present invention in  
33 automatic operation has great utility when a plurality of  
34 communication devices, either as separate devices or integrated  
35 with a camera, are in service and attempts are made to download  
36 image data. Image data requires a large memory, and downloading  
37 from a number of communication devices is time consuming.

1 Networks encountering such a load of image data can easily be  
2 overloaded, requiring either large increases in network band  
3 width, or a method of organizing the downloading in an automated  
4 manner. Such automation is a particularly useful feature of an  
5 embodiment of the present invention and is illustrated in Fig. 13  
6 where three sets of cameras 214, 216, and 218 and communication  
7 devices 220, 222, and 224 are connected to a single destination  
8 226 through a network 228.

9 Various ways of automating the transfer of image data from  
10 the cameras to the destination will be understood by those skilled  
11 in the art of automation after reading the description of the  
12 invention. A preferred embodiment involves programming the  
13 devices 220, 222, and 224 to automatically "re-dial" for a hook-  
14 up with the destination when a busy signal is received. The  
15 destination simply accepts a first call and ignores subsequent  
16 calls until the processing of the first call is complete. An  
17 alternate method includes the destination storing the numbers of  
18 the calling communication devices in the order received, and then  
19 notifying the next device in line when the destination is ready  
20 for accepting the next download. This approach has an advantage  
21 over the re-dialing approach in guaranteeing each device its  
22 priority.

23 Referring now to Fig. 14, an example is illustrated wherein a  
24 communication device is programmed to perform automatic  
25 operations. Block 230 (set up device) represents the programming  
26 that is accomplished through use of a PC 14, Smart card 36, or the  
27 computer/destination 18 through a network 16. Fig. 14 is a  
28 simplified example of programmed decisions made by a communication  
29 device. Details of programming for such operations are well  
30 understood by those skilled in the art and therefore are not  
31 described in detail.

32 The example of Fig. 14 illustrates the communication device,  
33 for example device 10, programmed to query the camera  
34 communication port 20 to determine if a camera is connected. The  
35 communication device, for example, can be programmed to check for  
36 a camera connection (block 232) at periodic intervals, or at  
37 certain times of the day. If the camera is connected, the

1 communication device can then receive and evaluate data from the  
2 camera, an operation which can be fully automatic if the camera is  
3 programmed to receive and respond to commands through line 22. If  
4 not, a user can manually trigger the camera 12 to download the  
5 data to the communication device. In either the case of automatic  
6 or manual download to the communication device, block 234  
7 represents this function. Block 236 indicates an option for a  
8 compatible camera 12, wherein the communication device queries the  
9 camera to determine what percentage of the image storage capacity  
10 is filled. If it exceeds a certain predetermined amount, for  
11 example 75%, the communication device responds by instructing the  
12 camera 12 to download the image data (block 234). If not, the  
13 device can continue to check for a camera connection and image  
14 memory available on a periodic basis, and/or at certain times.

15 Once image data is loaded, the communication device can  
16 respond to programming to perform any of a variety of operations  
17 as discussed above, such as encrypting, creating authentication  
18 data and relegating selected data for subsequent transmission to  
19 one or more destinations. This is indicated simply as block 238.

20 The communication device can be programmed to send the  
21 relegated data at certain times. This programming is symbolically  
22 indicated by block 240, and at the programmed time the device  
23 checks the output port 30 (Fig. 1) to determine if a connection is  
24 made to a network (block 242). If so, the communication device  
25 further checks to determine if the destination is connected and  
26 ready. This is indicated by block 244 for a single destination  
27 and by blocks 246 and 248 for two separate destinations, although  
28 any number of destinations are within the scope of the present  
29 invention.

30 Once the communication device determines that the destination  
31 is ready, the data is transmitted as indicated by blocks 250, 252  
32 and 254. Block 250 also indicates an option indicating  
33 programming of the communication device to include a unique ID  
34 with the transmitted data to connect the data to a specific  
35 location, i.e. database, within the destination. The purpose of  
36 Fig. 14 is primarily to illustrate automation within the  
37 communication devices of the present invention. Automation is

1 also possible in the destination 18, and in the camera 12 in those  
2 cases where the camera 12 is programmable.

3 Fig. 15 will now be used to discuss automation within the  
4 destination 18. It should also be understood that the present  
5 invention includes combinations in which automation occurs in the  
6 communication device, camera and destination, or in any  
7 combination of the three to accomplish required programming  
8 objectives.

9 Block 258 of Fig. 15 symbolizes programming of the  
10 destination 18 to perform operations, examples of which will be  
11 described in reference to the various blocks of Fig. 15. Block  
12 260 indicates the destination determining if the communication  
13 device is connected to the network. The destination can be  
14 programmed to check for a connection at various intervals or times  
15 of day, etc. The destination can also be programmed to respond to  
16 a signal from the communication device indicating a requirement to  
17 transmit data. Both of these options, either an active query to  
18 the communication device or a response from the communication  
19 device are included in the step indicated by block 260.

20 Once connection is established between the destination and  
21 the communication device, the destination can send instructions to  
22 the communication device as indicated by block 262. As with block  
23 260, this action by the destination can be self initiated or in  
24 response to an instruction received from the communication device  
25 to send data. The data is then received by the destination (block  
26 264) and processed (block 266). The communication device can be  
27 either separate from the camera or integrated with it.

28 Fig. 16 lists examples of data that can be sent by a  
29 destination to a communication device including instructions to  
30 the communication device to direct the camera to take a picture at  
31 a set time or at certain intervals. Account identification,  
32 titles or other information can be sent for inclusion in an image  
33 header, or for watermarking, etc. Operational data can be sent to  
34 inform the user when and where to take a picture. A map showing  
35 where to take a picture can be sent, for example, which can be  
36 displayed by the user on a camera visual display, and corrective  
37 notices can be sent informing the user of any problems with the



1 downloaded image data such as chronic underexposure, focus  
2 problems, etc. The destination can also send instructions to the  
3 communication device to check camera memory, download data,  
4 encrypt data, etc., all controlled by the destination.

5       Upon receiving data from the communication device (block  
6 264), the destination can automatically process the data according  
7 to specific programmed objectives (block 266). A number of  
8 possibilities are included in Fig. 16 under "Data Processing by  
9 Destination". In cases where data is received in unencrypted  
10 form, it can encrypt and store the data, or it can decrypt  
11 encrypted data and print images automatically or archive them.  
12 The destination 18 can also automatically distribute selected data  
13 items to other remote locations, such as on the web, or e-mail at  
14 a low resolution image for inspection prior to a sale. The  
15 destination can also store authentication data of an original  
16 image and create corresponding authentication data from a  
17 questionable image, and compare the two sets of authentication  
18 data to determine the validity of the questionable image.

19       In summary of the automatic features of the invention, the  
20 destination, for example a server, can call the communication  
21 device to notify it of a particular time to send data to a server,  
22 for example based on local and remote network load, server  
23 processing load, server storage capacity, fulfillment (printing),  
24 system load, and other factors. As explained above, there may be  
25 querying/handshaking between the communication device and the  
26 server to determine if there are sufficient images to send, i.e.  
27 to determine the space available in the image storage memory of  
28 the communication device or camera-device. Alternatively, the  
29 communication device can query the destination to initiate the  
30 sending of data.

31       Another automatic feature of the present invention is the  
32 automatic inclusion of prescribed information along with image  
33 data, such information including for example, a unique ID, date,  
34 time, etc. Closely related to the information included with an  
35 image is a phone number or network IP received by the device or  
36 camera for automatic dialing to a destination. The communication  
37 device can also automatically receive images and related

1 information by querying the destination at preprogrammed  
2 times/intervals. Another automatic feature includes automatic  
3 downloading based on priority when some users have priority over  
4 others.

5 Fig. 17 applies to the integrated camera-device of Fig. 9.  
6 The camera-device is first programmed as indicated by block 268.  
7 A picture is taken (block 270), and the programmed operations are  
8 performed (block 272). The camera-device can then check memory  
9 to determine if data should be downloaded (block 274). If memory  
10 space is low, the camera-device will check for a network  
11 connection (block 276) and alternatively also display a notice to  
12 the user of low storage capacity available (block 278). Once a  
13 connection is made to the network, the data is downloaded (block  
14 280). In general, all of the features discussed relative to the  
15 communication device 10 apply also to the camera 182 with an  
16 integrated communication device 180 as illustrated in Fig. 9,  
17 except for those comments that refer to the external connection  
18 between the camera and the communications device.

19 Although the present invention has been described above in  
20 terms of a specific embodiment, it is anticipated that alterations  
21 and modifications thereof will no doubt become apparent to those  
22 skilled in the art. It is therefore intended that the following  
23 claims be interpreted as covering all such alterations and  
24 modifications as fall within the true spirit and scope of the  
25 invention.

26 What is claimed is:

CLAIMS

- 1        1.    A communication device comprising:  
2            (a) camera communication means for sending and  
3        receiving data to and from a digital camera; and  
4            (b) network communication means for sending and  
5        receiving said data through a network, to and from a  
6        destination device.
- 1            2.    A communication device as recited in claim 1  
2        wherein said camera communication means utilizes an existing  
3        protocol of communication of said camera for communication  
4        to a PC, whereby said communication device is transparent to  
5        said camera.
- 1            3.    A communication device as recited in claim 1  
2        wherein said network communication means includes a modem.
- 1            4.    A communications device as recited in claim 3  
2        wherein said modem is connected via predefined phone numbers.
- 1            5.    A communication device as recited in claim 1  
2        wherein said network communication means includes means for  
3        connecting to an ethernet network.
- 1            6.    A communication device as recited in claim 1  
2        wherein said network communication means includes a network  
3        router.
- 1            7.    A communication device as recited in claim 1  
2        wherein said network communication means includes means for  
3        establishing a wireless connection to a network.
- 1            8.    a communication device as recited in claim 1  
2        wherein said network communication means includes means for  
3        establishing a satellite connection to a network.

1           9. A communication device as recited in claim 1  
2 wherein said destination device is a printer.

1           10. A communication device as recited in claim 1  
2 wherein said destination device is a phone switch.

1           11. A communication device as recited in claim 1  
2 wherein said destination device is a server.

1           12. A communication device as recited in claim 1  
2 wherein said communication device is programmable.

1           13. A communication device as recited in claim 1  
2 wherein said communication device has a unique  
3 identification.

1           14. A communication device as recited in claim 13  
2 wherein said communication device sends said unique  
3 identification as part of said data to be transmitted to said  
4 destination device.

1           15. A communication device as recited in claim 1  
2 wherein said communication device further comprises a counter  
3 to provide a unique identification number for image data  
4 representing a particular image.

1           16. A communication device as recited in claim 15  
2 wherein said communication device sends said unique  
3 identification of each said image as part of said  
4 transmission.

1           17. A communication device as recited in claim 1  
2 wherein said communication device includes means for  
3 providing time and date identification data indicating the  
4 time and date of processing of each image.

1           18. A communication device as recited in claim 17

2 wherein said communication device receives said time and date  
3 identification data from the network.

1 19. A communication device as recited in claim 18  
2 wherein said communication device sends said time and date  
3 identification data as part of said data transmitted to said  
4 destination device.

1 20. A communication device as recited in claim 1  
2 wherein said communication device includes global positioning  
3 detection apparatus.

1 21. A communication device as recited in claim 20  
2 wherein said communication device sends global position data  
3 as part of said data transmittal to said destination device.

1 22. A communication device as recited in claim 12  
2 wherein said camera communication means includes means for  
3 entering data for programming said communication device.

1 23. A communication device as recited in claim 12  
2 wherein said communication device is programmed with data  
3 received from said destination device.

1 24. A communication device as recited in claim 1  
2 further comprising a Smart card port for reception of a Smart  
3 card.

1 25. A communication device as recited in claim 12  
2 wherein said communication device is programmable to receive  
3 camera operational parameter data and to send said camera  
4 operational parameter data to a camera connected to said  
5 communication device.

1 26. A communication device as recited in claim 12  
2 wherein said communication device is programmable to  
3 watermark image data received from a camera.

1           27. A communication device as recited in claim 12  
2 wherein said communication device is programmable to encrypt  
3 image data received from a camera.

1           28. A communication device as recited in claim 12  
2 wherein said communication device is programmable to form  
3 image authentication data.

1           29. A communication device as recited in claim 1  
2 wherein said network communication means is for sending data  
3 to a plurality of network destination devices.

1           30. A communication device as recited in claim 1  
2 further comprising a visual display for indicating the  
3 progression of said sending data.

1           31. A communication device as recited in claim 30  
2 wherein said visual display indicates a remaining number of  
3 images to be sent.

1           32. A communication device as recited in claim 30  
2 wherein said visual display indicates remaining time for  
3 transmission.

1           33. A communication device as recited in claim 30  
2 wherein said visual display indicates established connection  
3 to the camera.

1           34. A communication device as recited in claim 30  
2 wherein said visual display indicates established connection  
3 to said destination device.

1           35. A communication device as recited in claim 1  
2 wherein said camera communication means includes a serial  
3 port.

1           36. A communication device as recited in claim 1  
2 wherein said camera communication means includes a parallel  
3 port.

1           37. A communication device as recited in claim 1  
2 wherein said camera communication means includes a SCSI port.

1           38. A communication device as recited in claim 1  
2 wherein said camera communication means includes a USB port.

1           39. A communication device as recited in claim 1  
2 wherein said camera communication means includes an infrared  
3 port.

1           40. A method for transmitting digital data from a  
2 camera to a destination device said method comprising:  
3           (a) performing operations by use of a communication  
4 device, said operations including  
5               (i) sending said digital data from a camera to  
6 said communication device; and  
7               (ii) structuring said camera data within said  
8 communication device to a compatible protocol for  
9 transmission through a network to a communication network to  
10 a destination device.

1           41. A method as recited in claim 40 wherein said  
2 destination device is a computer.

1           42. A method as recited in claim 40 wherein said  
2 destination device is a computer.

1           43. A method as recited in claim 40 wherein said  
2 destination device is a network.

1           44. A method as recited in claim 40 wherein said  
2 destination device is a printer.

1           45. A method as recited in claim 40 wherein said  
2 operations further include  
3           (a) encrypting said digital camera data to form  
4 encrypted camera data; and  
5           (b) structuring said encrypted data to a compatible  
6 protocol for transmission through a network to a destination  
7 device.

1           46. A method as recited in claim 40 wherein said  
2 operations further include  
3           (a) creating authentication data; and  
4           (b) structuring said authentication data to a  
5 compatible protocol for transmission through a network.

1           47. A method as recited in claim 40 further comprising  
2 programming said communication device to add additional data  
3 for transmission with said camera data to a network.

1           48. A method as recited in claim 40 further  
2 comprising:  
3           programming said communication device with operational  
4 instructions for transmission to said camera.

1           49. A method as recited in claim 40 further  
2 comprising:  
3           programming said communication device for encryption of  
4 camera data.

1           50. A method as recited in claim 40 further  
2 comprising:  
3           programming said communication device for creating  
4 authentication data.

1           51. A method as recited in claim 40 further  
2 comprising:  
3           programming said communication device for watermarking  
4 of camera data.



1           52. A method as recited in claim 40 further  
2 comprising:  
3           programming said communications device for  
4 fingerprinting data.

1           53. A method as recited in claim 50 further  
2 comprising:  
3           (a) transmitting unencrypted digital camera data to a  
4 first said destination device; and  
5           (b) transmitting said authentication data to a second  
6 said destination device.

1           54. A method for transmitting digital camera data  
2 comprising:  
3           (a) uploading said digital camera data from a camera  
4 to a communication device; and  
5           (b) structuring said camera data within said  
6 communication device to a compatible format for transmission  
7 and display of said digital camera data on a video/TV  
8 receiver.

1           55. A digital camera comprising:  
2           (a) means for converting light to digital image data;  
3           (b) port means for receiving and sending digital data;  
4           (c) means for transmitting and receiving said digital  
5 data to and from a destination device by way of a  
6 communication network; and  
7           (d) means for automatically performing one or more  
8 programmed operations upon occurrence of a condition.

1           56. A digital camera as recited in claim 55 further  
2 comprising means for securing said digital image data.

1           57. A digital camera as recited in claim 56 wherein  
2 said programmed operations include said transmitting said  
3 data.

1           58. A communication device as recited in claim 1  
2 further comprising means for automatically performing a  
3 programmed operation upon occurrence of a condition.

1           59. A communication device as recited in claim 58  
2 wherein said programmed operation is receiving of image data  
3 from a camera and performing an operation in response to  
4 receiving said image data.

1           60. A communication device as recited in claim 58  
2 wherein said condition is an instruction received from a  
3 destination by way of said network.

1           61. A communication device as recited in claim 58  
2 wherein said condition is a specific time to perform said  
3 operation.

1           62. A communication device as recited in claim 58  
2 wherein said condition is slow traffic on the network.

1           63. A communication device as recited in claim 58  
2 wherein said operation is sending data to said network.

1           64. A communication device as recited in claim 58  
2 wherein said condition is a predefined amount of camera  
3 memory capacity available for storage of additional image  
4 data.

1           65. A communication device as recited in claim 58  
2 wherein said operation is receiving additional information  
3 from a remote destination.

1           66. A communication device as recited in claim 65  
2 wherein said additional information is for accompanying  
3 specific image data.

1           67. A communication device as recited in claim 65  
2           wherein said additional information is operational  
3           instructions.

1           68. A communication device as recited in claim 58  
2           wherein said operation is connecting to a network.

1           69. A communication device as recited in claim 58  
2           wherein said operation is disconnecting from a network.

1           70. A communication device as recited in claim 61  
2           wherein said operation is taking a picture.

1           71. A communication device as recited in claim 61  
2           wherein said operator is downloading said data to said  
3           destination device.

1           72. A communication device as recited in claim 61  
2           wherein said operation is uploading data from said  
3           destination device.

1           73. A communication device as recited in claim 72  
2           wherein said data includes a camera ID and account number.

1           74. A communication device as recited in claim 73  
2           wherein said operation further includes downloading said  
3           camera ID and account number upon occurrence of a second  
4           condition.

1           75. A communication device as recited in claim 1  
2           further comprising a ROM programmed for a specific purpose.

1           76. A communication device as recited in claim 75  
2           wherein said specific purpose is to restrict downloading to a  
3           specific destination.

1           77. A communication device as recited in claim 1

2 further comprising visual display means for indicating  
3 operation status.

1 78. A communication device as recited in claim 77  
2 wherein said display means indicates when said device is  
3 programmed to connect to a network, and indicate when a  
4 network connection is made to said device.

1 79. A digital camera as recited in claim 57 wherein  
2 said condition includes said camera receiving a signal from  
3 said remote destination.

1 80. A digital camera as recited in claim 57 wherein  
2 said condition includes said camera programmed to perform a  
3 said operation at a specific time.

1 81. A digital camera as recited in claim 57 wherein  
2 (a) said means for securing includes means for  
3 creating encrypted data from said digital image data;  
4 (b) said programmed operations further include said  
5 securing, and said transmitting; and  
6 (c) said digital data includes information to be  
7 transmitted to said destination.

1 82. A digital camera as recited in claim 81 wherein  
2 said digital data includes  
3 (a) camera identification data; and  
4 (b) user identification data.

1 83. A method as recited in claim 40 further  
2 comprising:  
3 said communication device automatically responding to  
4 one or more conditions by performing one or more programmed  
5 operations.

1 84. A method as recited in claim 83 wherein  
2 (a) said programmed operation is said transmitting;

3           and  
4           (b) said condition includes a signal from said  
5           destination.

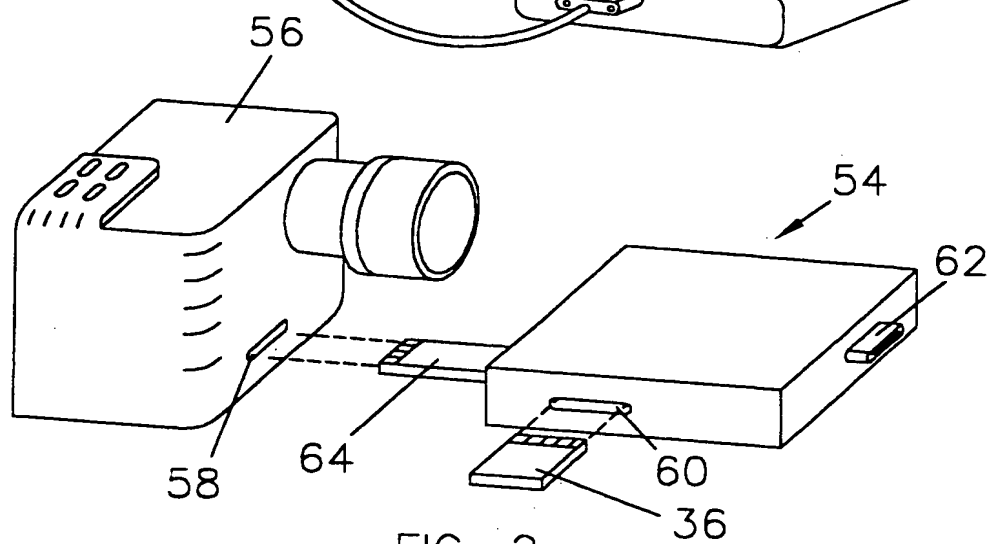
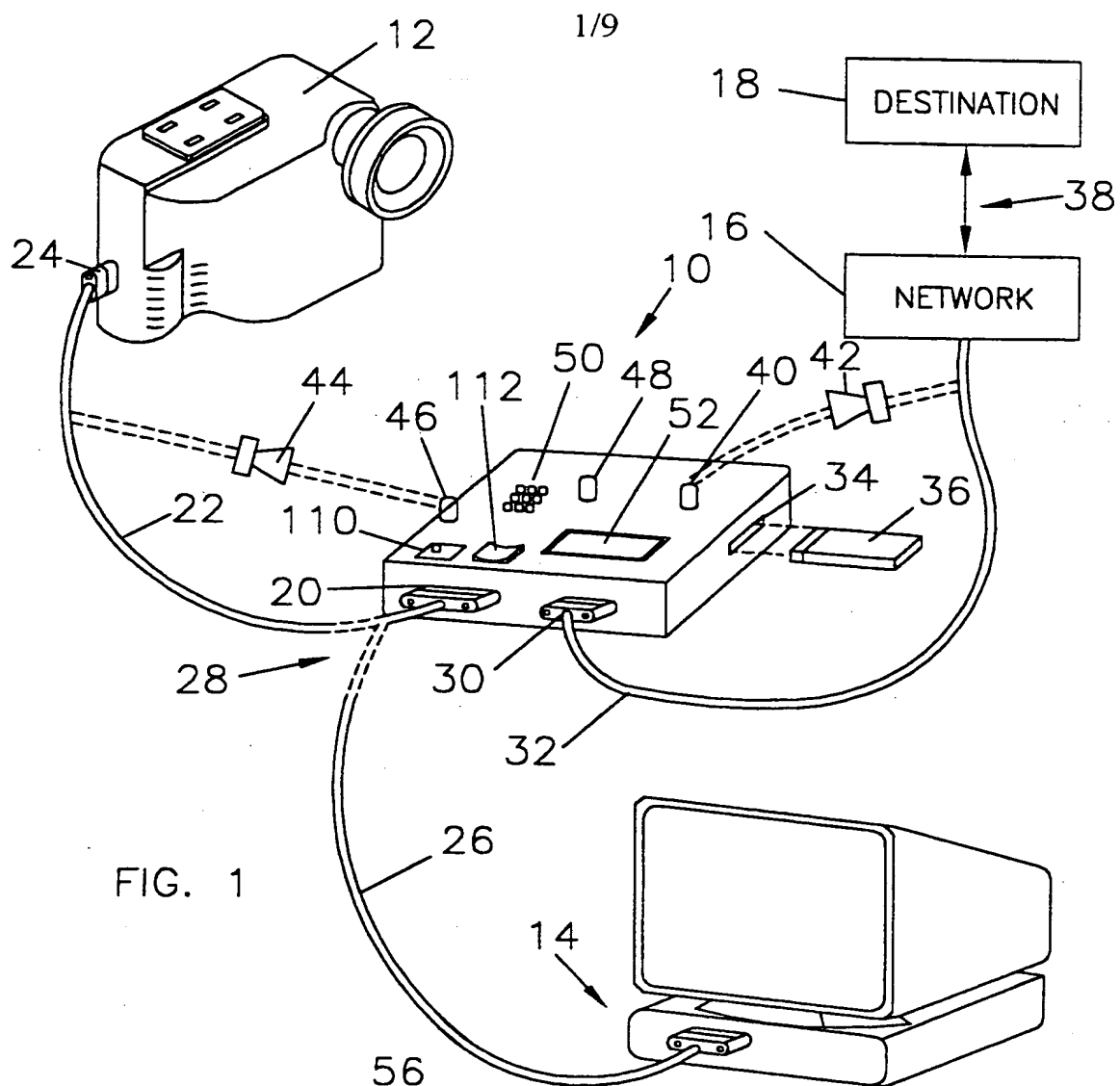
1           85. A communication device as recited in claim 1  
2           further comprising means for including identification of a  
3           camera that secured a particular image along with said data  
4           representing said particular image.

1           86. A digital camera as recited in claim 55 further  
2           comprising means for including identification of said camera  
3           along with said data representing said particular image.

1           87. A method as recited in claim 40 further comprising  
2           means for including identification of a camera that secured a  
3           particular image along with said data representing said  
4           particular image.

1           88. A method as recited in claim 40 further comprising  
2           means for including a unique number with each group of said  
3           digital data representing a particular image.

1           89. A digital camera as recited in claim 86 further  
2           comprising means for including a unique number with each said  
3           data representing said particular image.



SUBSTITUTE SHEET (RULE 26)

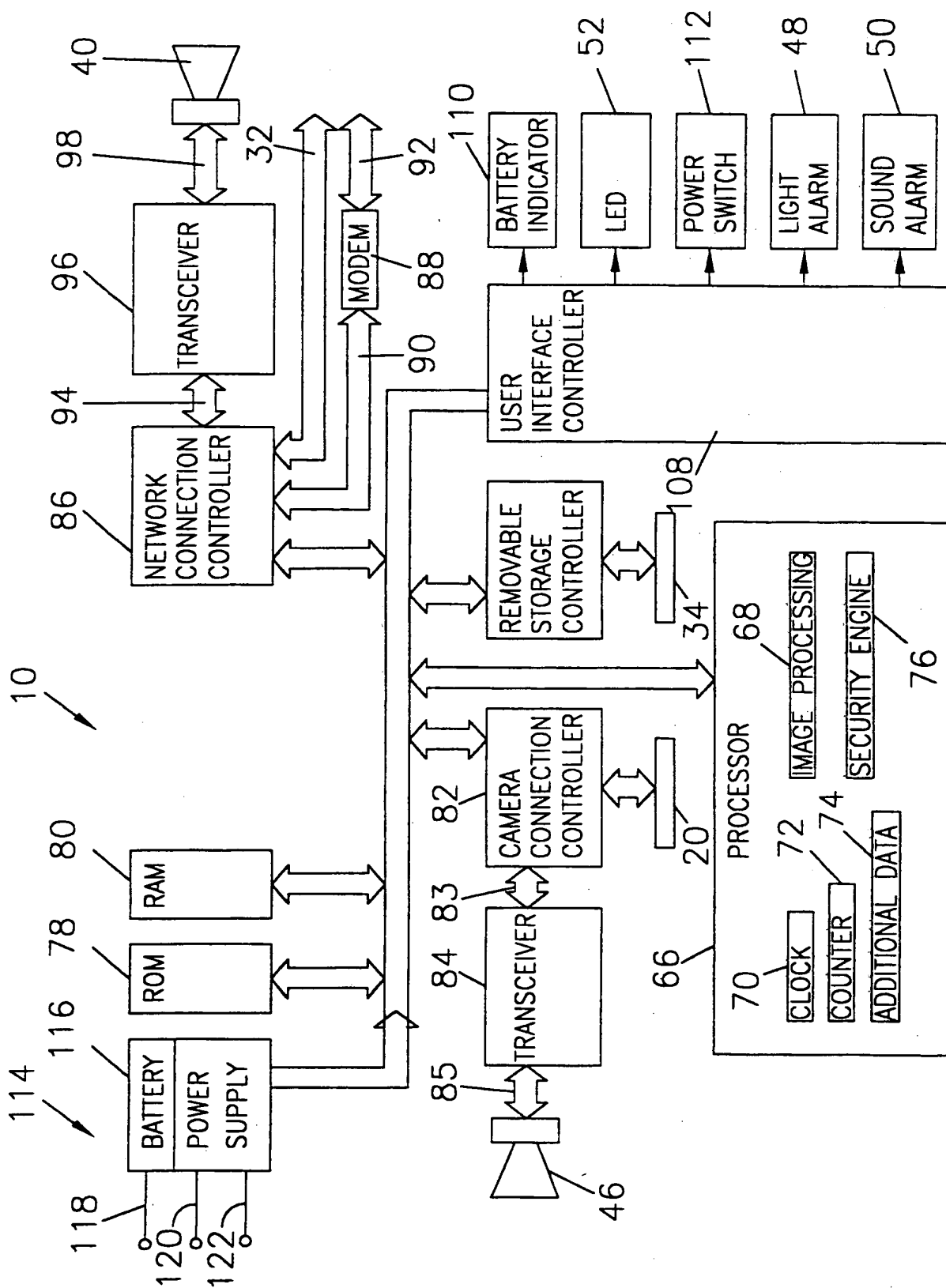


FIG. 3

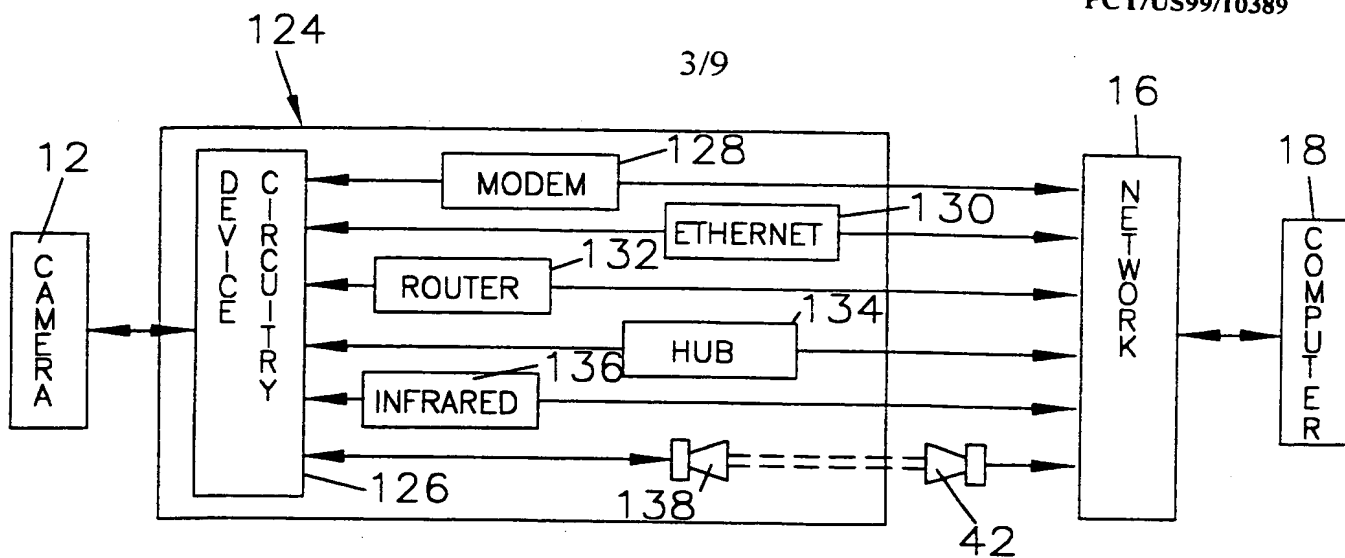


FIG. 4

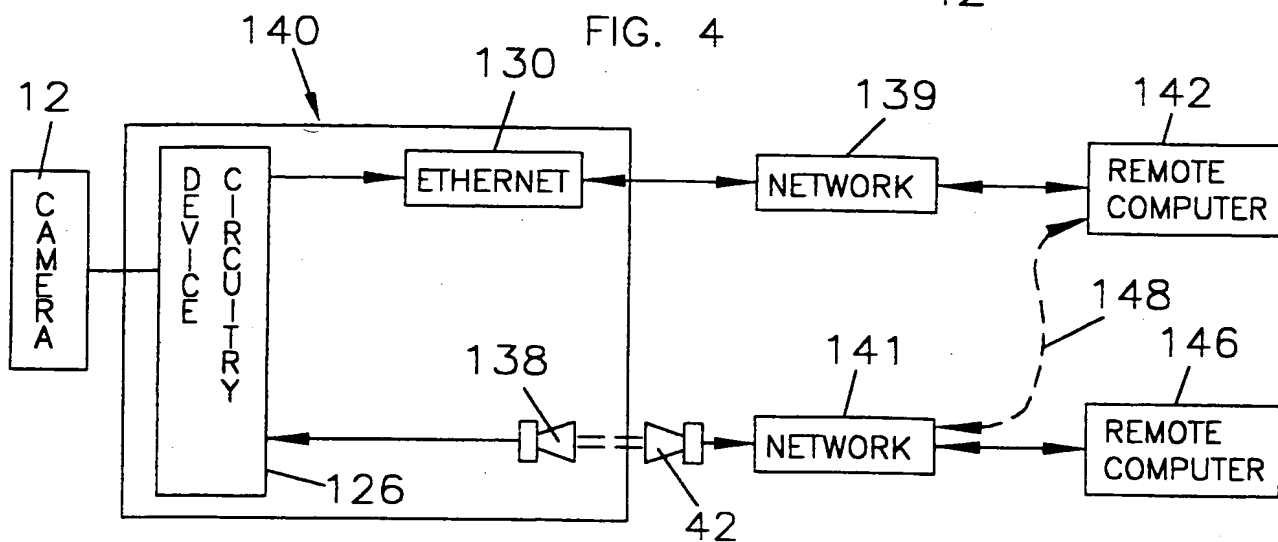


FIG. 5

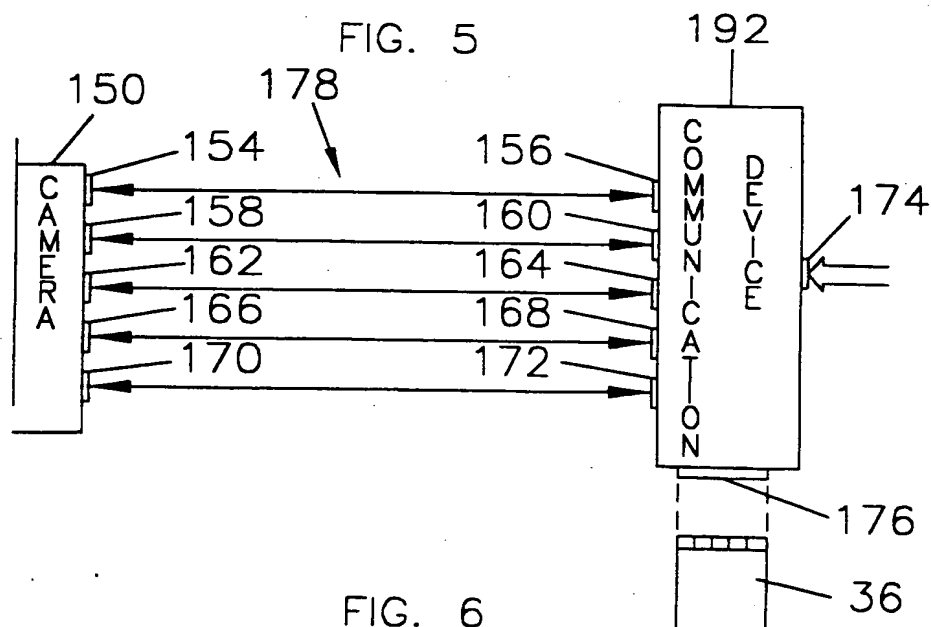


FIG. 6



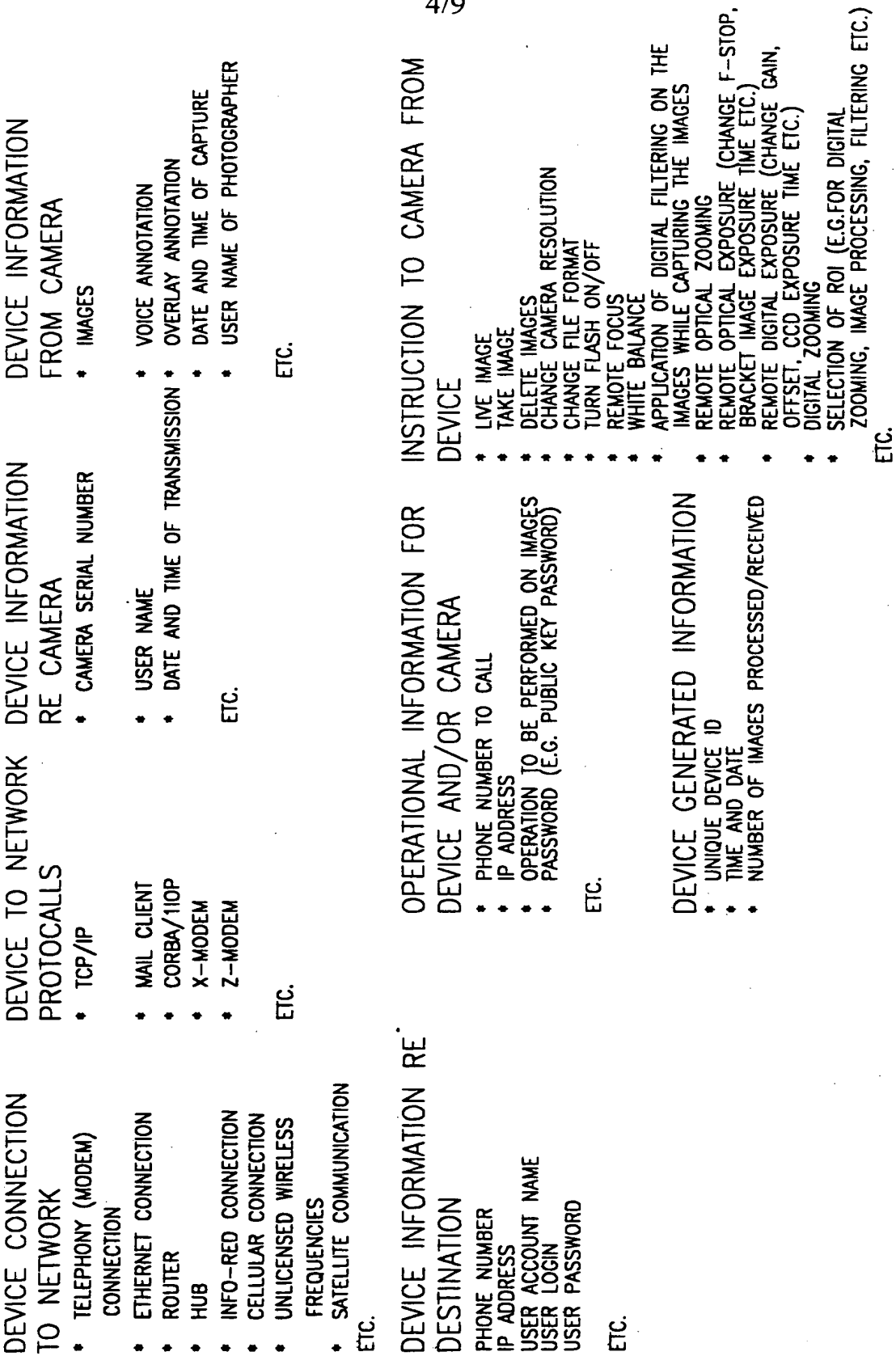


FIG. 7

5/9

## DEVICE OPERATIONS ON IMAGE DATA

## OPERATING ON FILES:

- \* COMPRESSING/EXPANDING FILES
- \* PARSING FILES AND CONVERTING TO DIFFERENT FORMATS

## PERFORMING IMAGE ENHANCEMENT OPERATIONS SUCH AS:

- \* AUTOMATIC COLOR CORRECTION
- \* RESAMPLING
- \* SHARPENING
- \* ROTATION
- \* GENERIC IMAGE FILTERING

ETC.

## ADDING IDENTIFIERS TO THE IMAGES SUCH AS:

- \* STAMPING THE DATE AND TIME ON THE IMAGE
- \* ADDING THE USER'S NAME
- \* ADDING CAMERA UNIQUE ID
- \* ADDING AN IMAGE UNIQUE ID
- \* ADDING THE TIME AND DATE OF TRANSMISSION

## SECURE THE IMAGE VIA:

- \* WATERMARKING IMAGES
- \* AUTHENTICATING IMAGES
- \* ENCRYPTION IMAGES

FIG. 8

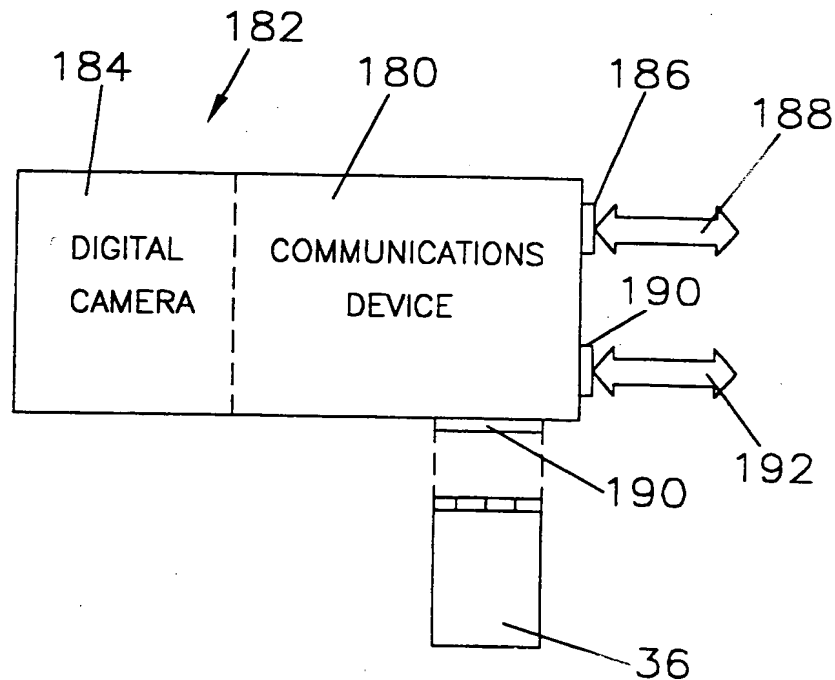


FIG. 9

6/9

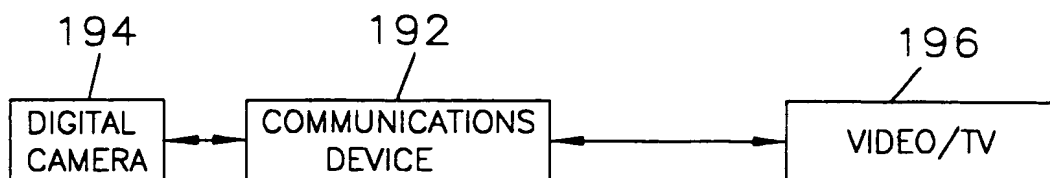


FIG. 10

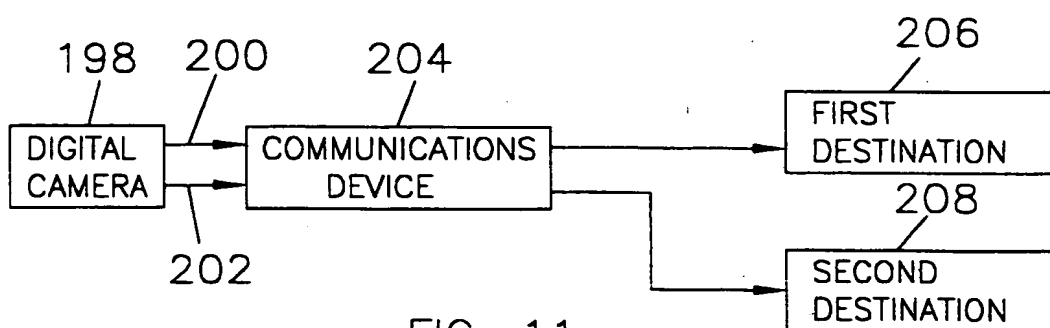


FIG. 11

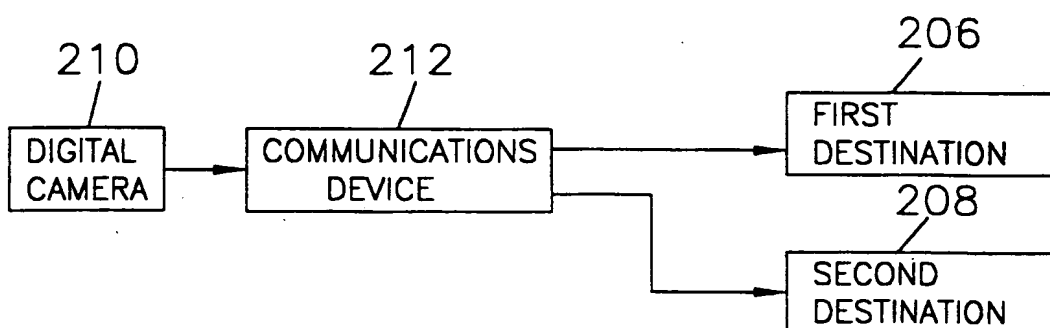


FIG. 12

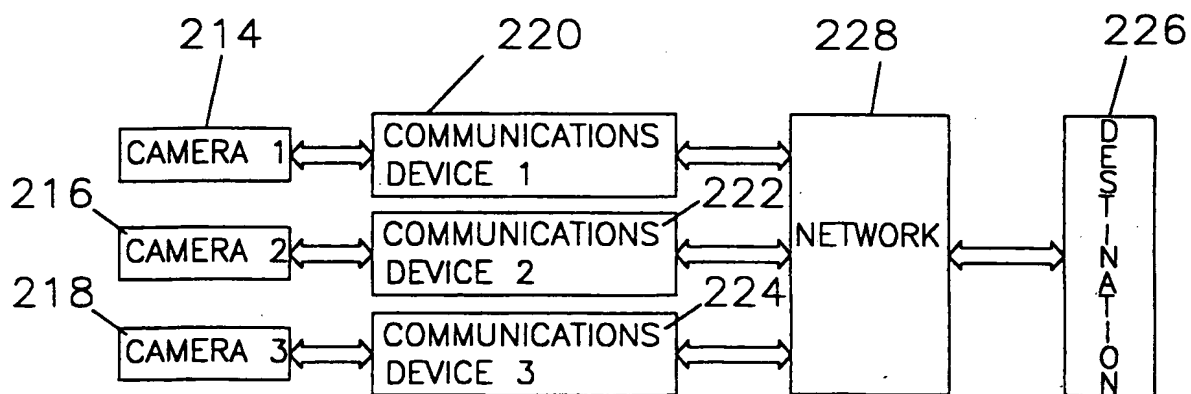


FIG. 13

7/9

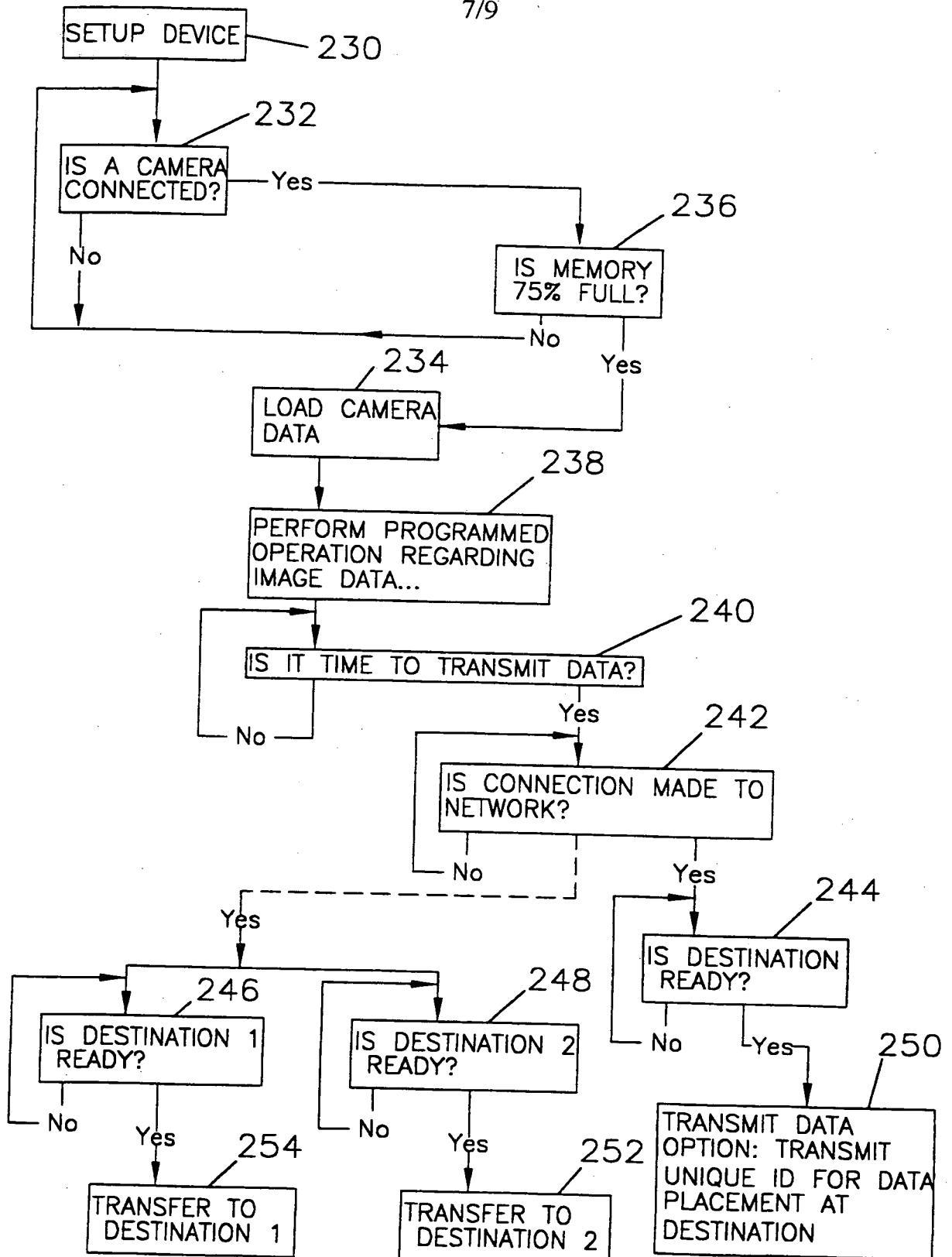


FIG. 14

8/9

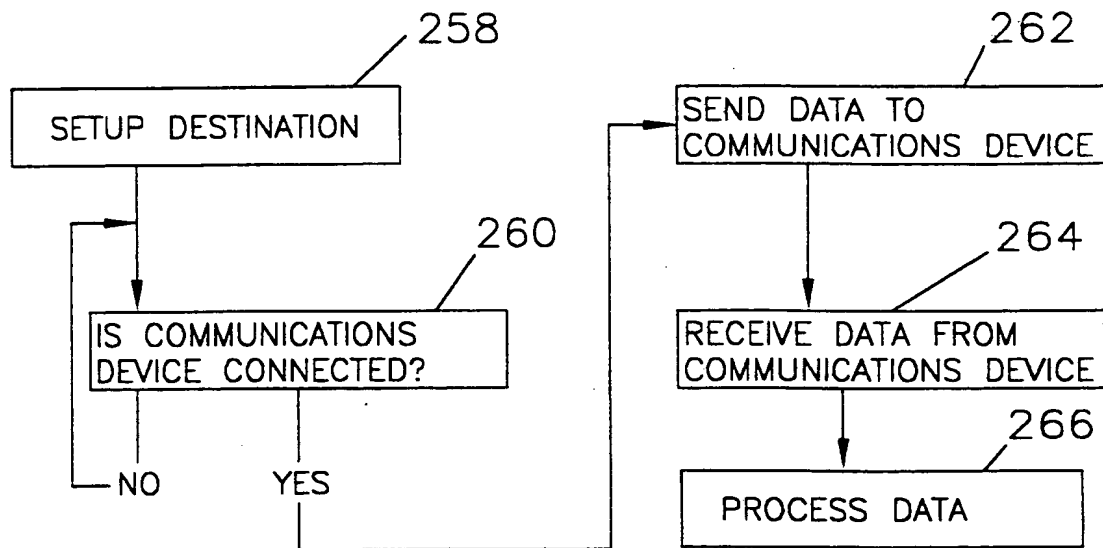


FIG. 15

DATA FROM DESTINATION TO DEVICE

1. TAKE A PICTURE AT A SET TIME OR AT INTERVALS
2. FOR IMAGE HEADER, ETC.
  - A) ACCOUNT ID
  - B) TITLE
  - C) NAME , ADDRESS, ETC.
3. OPERATIONAL DATA
  - A) WHERE TO TAKE A PICTURE
  - B) MAP OF LOCATION
  - C. CORRECTIVE NOTICES
4. INSTRUCTION TO DOWNLOAD DATA

DATA PROCESSING DETINATION

1. ENCRYPT AND STORE DATA
2. DECRYPT DATA AND PRINT IMAGE
3. ARCHIVE THE IMAGE
4. SEND IMAGE DATA TO REMOTE LOCATION
5. PLACE IMAGE DATA ON THE WEB
6. SEND DATA BY E-MAIL WITH LOW RESOLUTION OF IMAGE
7. SEND DECRYPTED IMAGE TO A FIRST DESTINATION
8. SEND AUTHENTICATION DATA TO A SECOND DESTINATION
9. COMPARE QUESTIONABLE IMAGE DATA FROM A THIRD SOURCE WITH AUTHENTICATION DATA AND DISPLAY THE RESULT

FIG. 16

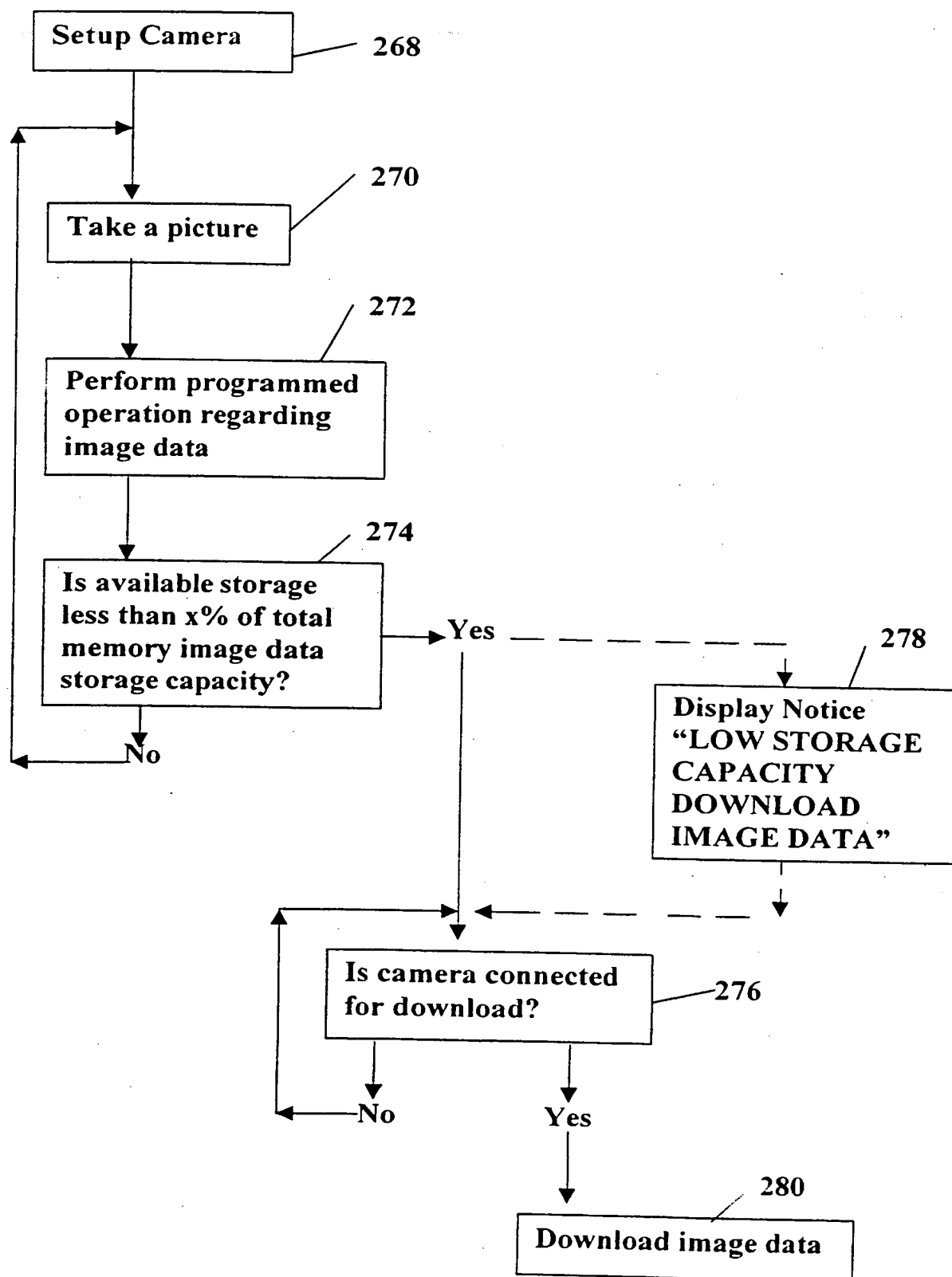


FIG. 17

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
6 January 2000 (06.01.2000)

PCT

(10) International Publication Number  
**WO 00/001138 A3**

(51) International Patent Classification<sup>6</sup>: **H04N 5/76.**  
7/00, 7/14, 5/232

(74) Agent: **JAFFER, David, H.;** Rosenblum, Paris & Isaacs,  
15th floor, 160 West Santa Clara Street, San Jose, CA  
95113 (US).

(21) International Application Number: PCT/US99/10389

(81) Designated State (national): JP.

(22) International Filing Date: 11 May 1999 (11.05.1999)

(84) Designated States (regional): European patent (AT, BE,  
CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC,  
NL, PT, SE).

(25) Filing Language: English

Published:

(26) Publication Language: English

--- with international search report

(30) Priority Data:  
09/105,594 26 June 1998 (26.06.1998) US

(88) Date of publication of the international search report:  
22 August 2002

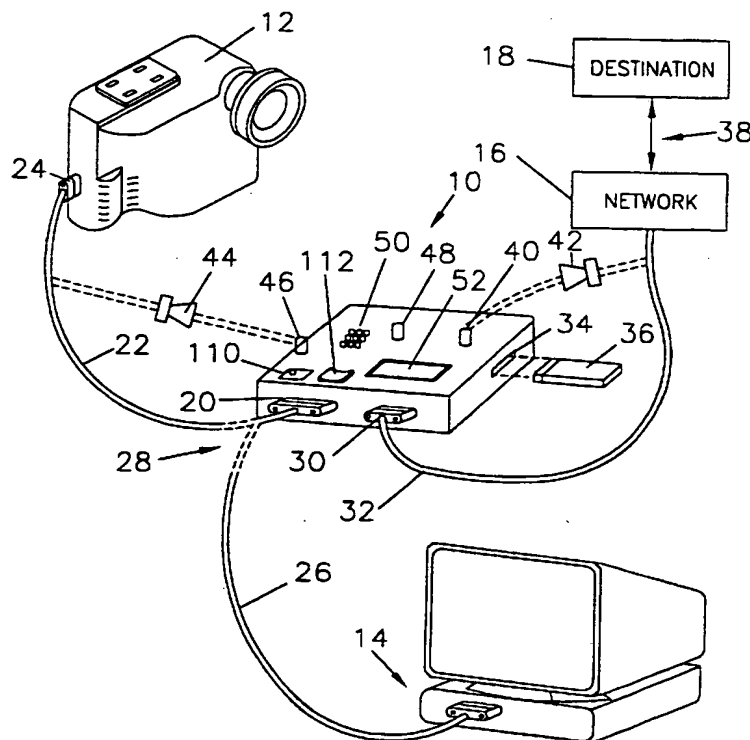
(71) Applicant: **FOTONATION, INC.** [US/US]; 199 California  
Drive, Millbrae, CA 94030 (US).

(15) Information about Correction:  
**Previous Correction:**  
see PCT Gazette No. 12/2001 of 22 March 2001, Section  
II

(72) Inventors: **STEINBERG, Eran;** 372 Douglas Street, San  
Francisco, CA (US). **PRILUTSKY, Yury;** 1426 Shoal  
Drive, San Mateo, CA 94404 (US). **RAFER, Scott, Neil;**  
1530 20th Street, San Francisco, CA 94107 (US).

For two-letter codes and other abbreviations, refer to the "Guid-  
ance Notes on Codes and Abbreviations" appearing at the begin-  
ning of each regular issue of the PCT Gazette.

(54) Title: CAMERA NETWORK COMMUNICATION DEVICE



(57) Abstract: A communication device (10) for interconnecting a digital camera (12) to a communication network (16) for downloading data to a remote computer. The device (10) has a network communication port (30) for establishing communication with a network (16) via a pre-defined protocol and communication mode, and has a camera communication port (20) such as a serial, parallel, SCSI, USB or Irda-port that imitates the back end application of a PC (14), for connection to a digital camera (12) for sending and receiving data to and from the camera (12). The camera communication port (20) is also used for input of programming and setup data to the communication device (10) from a PC (14). The device can be programmed to operate on the data directly, such as in the case of data for storage or operational direction, and/or direct the data to the camera. The device may also have a Smart card socket (34) into which a user can insert a card to input data, such as user and camera I.D., user authorization, image marking, camera operational parameters, remote computer/destination address, etc. The device can be programmed to perform encryption, authentication, watermarking and fingerprinting procedures, as well as structuring the data for transmission over a particular network, and to automatically perform operations, such as at specific times or in response to data input.

WO 00/001138 A3

## INTERNATIONAL SEARCH REPORT

I International application No.  
PCT/US99/10389

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) : H04N 5/76, 7/00, 7/14, 5/232

US CL : 348/231, 232, 233, 552, 15, 211; 380/10

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 348/231, 232, 233, 552, 15, 211; 380/10

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

APS

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X — Y	US 5,577,107 A (INAGAKI) 19 November 1996, cols. 1-2.	1-4, 12, 25, 29, 30, 33-36, 38, 40- 43, 48, 55, 58, 60, 63, 68-69, 77- 78, 83-84  5-11, 13-28, 32, 37, 39, 44-51, 54, 56-60, 64-67, 75, 79-82, 85-93, 95- 97

☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex

"	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"B"	earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search

10 SEPTEMBER 1999

Date of mailing of the international search report

25 OCT 1999

Name and mailing address of the ISA/US

Commissioner of Patents and Trademarks

Box PCT  
Washington, D.C. 20231

Facsimile No. (703) 305-3230

Authorized officer

JACQUELINE WILSON

Telephone No. (703) 308-5080



## INTERNATIONAL SEARCH REPORT

1 cation No.  
PCT/US99/10389

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5,674,003 A (ANDERSEN et al.) 07 October 1997, col. 13, lines 31-37).	5-11,13-28,32,37,39,44-51,54,56-60,64-67,75,79-82,85-93,95-97
Y	US 5,625,410 A (WASHINO et al.) 29 April 1997, col. 9, lines 1-19.	7, 8, 17-21, 39
Y	US 5,594,736 A (TATSUMI et al.) 14 January 1997, col. 15, lines 11-23.	15, 16, 23,89
Y	US 5,477,264 A (SARBADHIKARI et al.) 19 December 1995, col. 8, lines 32-49.	22, 54, 64, 75, 90-93, 95-97
Y	US 5,754,227 A (FUKUOKA) 19 May 1998, col. 5, lines 30-48.	37
X,P	US 5,896,128 A (BOYER) 20 April 1999, entire document	1-30, 32-51, 53-61, 63-69, 75, 77-98

Form PCT/ISA/210 (continuation of second sheet)(July 1992) \*

**THIS PAGE BLANK (USPTO)**